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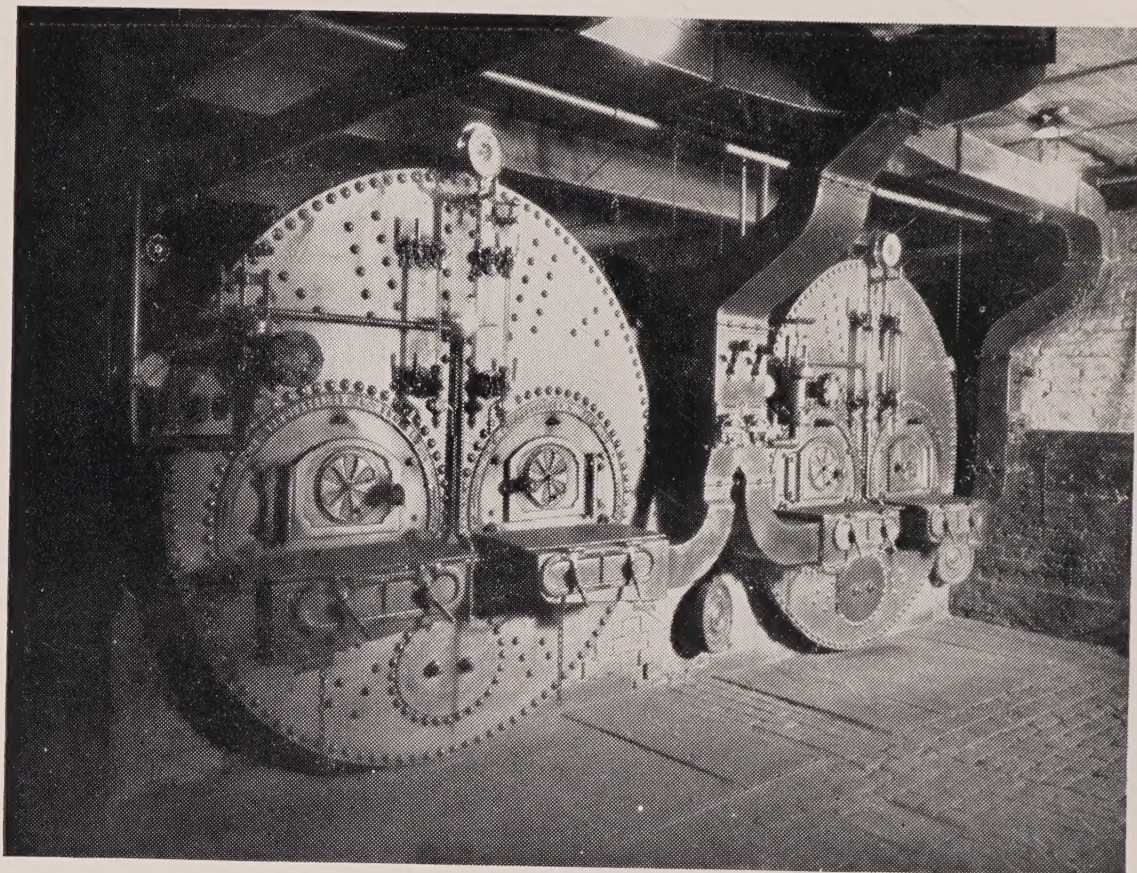
THE JOURNAL OF THE NATIONAL SMOKE ABATEMENT SOCIETY

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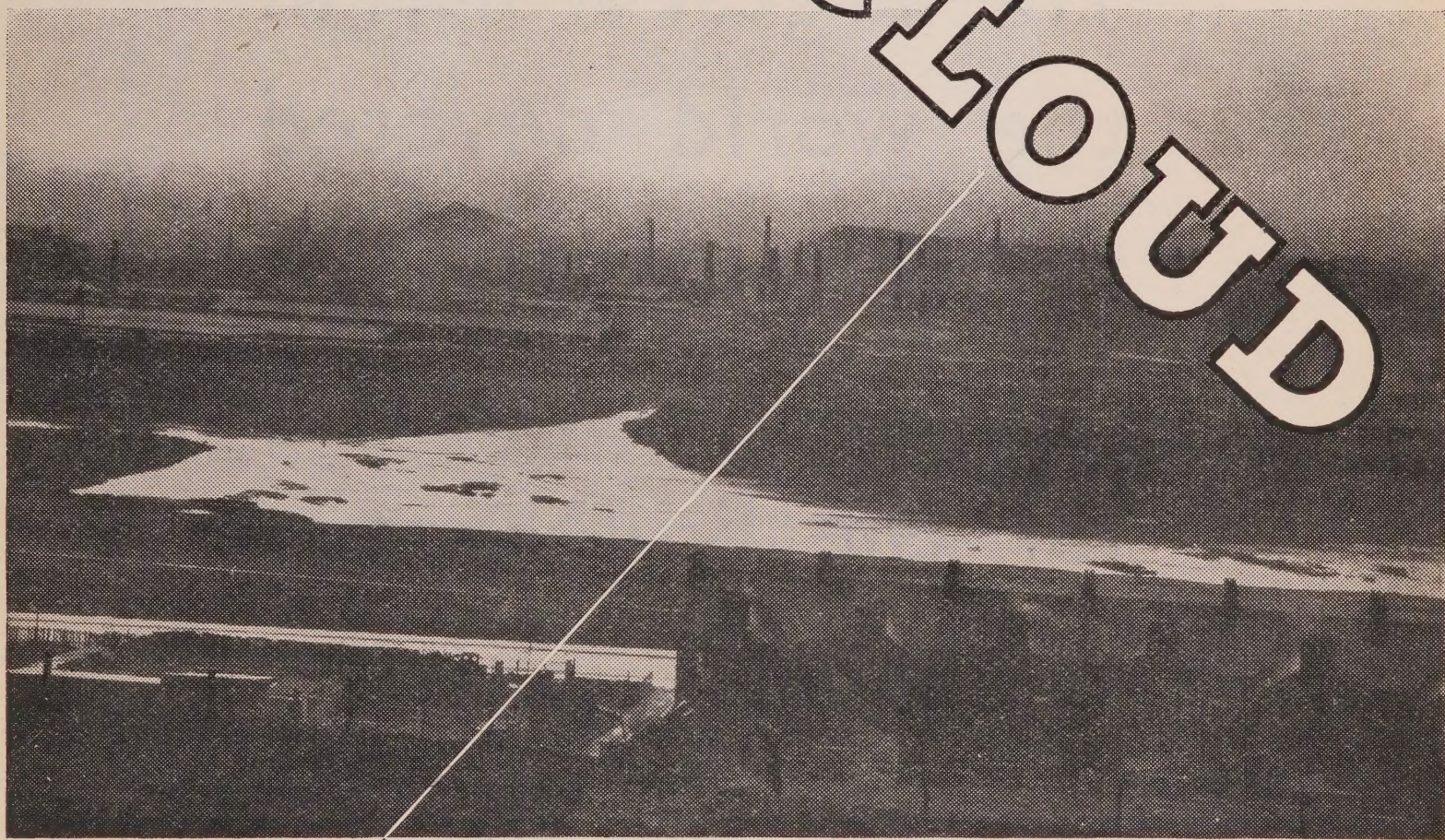
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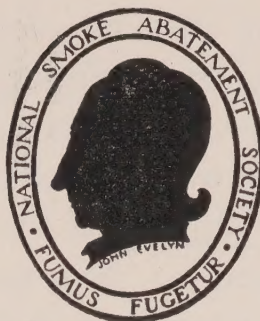
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The Journal of the National Smoke Abatement Society

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The Journal is open for free discussion of all aspects of the smoke problem, and the opinions expressed in contributed articles are not necessarily the same as the views of the Society. Quotations and abstraction of matter appearing in the Journal is welcomed, provided the usual acknowledgements are made.

COMMENTARY

WE publish in this issue the report on a questionnaire sent to Housing Authorities on smokeless equipment in housing schemes. It was known that many authorities were erecting houses with little or no consideration of the need for smoke reduction, and the report, which has been drawn up by Miss Marion Fitzgerald, confirms how little advantage has been taken of extensive housing programmes to give the tenant the facilities and encouragement which would ensure new homes being smokeless. It is true that the smoke which will be emitted from new housing estates will be much less than it would have been a few years ago ; the progress of gas and electricity, in even the smaller cottage type of house, is to be welcomed, even though it has not yet developed as far as it will ; but what the report terms the crux of the problem, the open fire, has been considered only by a handful of authorities, and by these only experimentally.

The pity of it is that such a unique opportunity for effective smoke reduction should have come too soon to allow the newer developments in the use of solid fuels to be fully utilized. Or perhaps it should be said the other way : it is a pity that the new developments were not made available earlier, or that some really effective means existed for ensuring all such developments being made known to those who should be concerned and for co-ordinating the various factors which are necessary to achieve successful results. The Society could do a great deal, if it could afford the necessary organisation, to prevent what is, frankly, an appalling and largely unnecessary perpetuation of the domestic smoke evil. To reduce smoke from existing houses is a far more difficult task than to prevent it in new ones, and yet the number of smoke-producing houses is being added to every day.

As a result of the report of its delegates on our recent exhibition and conference at the Science Museum, the Uxbridge Urban District Council decided to impress upon the inhabitants of the town, by enclosing a leaflet on the subject with its rate notes, the need for individual effort in promoting smoke abatement. The leaflet was obtained from the Society, and as a result we hope Uxbridge will be able to note a marked improvement in the state of its chimneys. Although many local authorities have from time to time conducted smoke abatement propaganda this is the first time that such direct and complete appeal has been made. We should like to congratulate the members of the Uxbridge Council on their action and to draw to it the attention of members of other Councils who read this *Journal*. Some time ago in these pages it was argued that in spite of being less smoky than the North, the South was more concerned about reducing smoke, and it is interesting to note that this first general appeal to ratepayers should have been made by a South-country town. Surely a Northern town could follow suit?

On another page is published an article on the recent fogs, in which striking quotations are given showing the unpleasant consequences of coal smoke when mixed with fog. The Earl of Crawford and Balcarres a little time ago, in opening a new showroom of coal-burning appliances, was reported to have said that more injury to the public health was caused by tobacco smoke than by coal smoke. He did not give any evidence to support this extraordinary statement, and we wonder what evidence he could produce that would even faintly compare with the injury revealed by this new account of the effects caused by coal smoke.

On another page is given a short report of a new smoke-reducing coal fire, a first-fruit of the

researches of the Coal Utilisation Council and the Combustion Appliance Makers' Association. It will be seen that the quantity of smoke emitted by a coal fire is reduced, chiefly as a result of the substantial reduction during the period of ignition. This is certainly the worst smoke, and to cure that heavy pall that is formed in the early morning, and which sometimes hangs about all day, would be a decided improvement. As, however, users can hardly be expected to switch on the gas device each time they re-stoke the fire, the distillation smoke from each new charge of coal will not be reduced. Thus although the fire will give a valuable reduction of smoke it cannot be described as smokeless and for that reason cannot be considered as desirable as a fire using smokeless fuel. What can be said, nevertheless, is that where raw coal is still being burned, and for new grates in which, unfortunately, raw coal will be burned, it is a definite advance to use this appliance. We can wish it success in its enormous potential market, even though we hope that the market may rapidly disappear.

Please note the announcement relating to the publication of the Proceedings of the Annual Conference at South Kensington. This was the biggest and most valuable conference for many years and the report is similarly one of the best volumes on the smoke problem available. The range covered is wide but not diffuse, the papers are authoritative and practical, and there are many valuable points to be gleaned from the discussions also printed. The volume, 116 quarto pages, is available in limited numbers, at a price of 2/- post free, and we would urge an early order from all who wish to have one. We regret that the high cost of printing such a report makes it impossible to let members have copies free of charge, and regret too that we cannot afford to print some thousands to broadcast in the many quarters where such a report would be valued.

SMOKELESS EQUIPMENT IN HOUSING SCHEMES

REPORT ON RECENT QUESTIONNAIRE

In April, 1936, the National Smoke Abatement Society sent a questionnaire to all the larger local authorities asking what their practice was as regards the heating and cooking appliances fixed in their new houses. Copies of the questionnaire were also sent to the voluntary housing societies.

The total number of replies received was 131 from local authorities, and 46 from housing societies. Of the latter 10 had built too few houses or considered their experience did not justify filling up the inquiry form and their replies were therefore excluded from the total to be summarized.

A great many of the replies did not contain all the information asked for so it was not possible to compile tables shewing percentages as to the use of different methods. Enough information was, however, received to shew what is the general practice of local authorities and housing societies. It was obvious that in many cases the question of preventing smoke from house chimneys had not been taken into consideration. The replies to question 21 "Have any special experiments for smoke abatement been made in your housing schemes?" were accordingly negative. There were however, exceptions as will be seen later, and question 15 "Do you know if in any cases grates or ranges have been found to be suitable for coke or other forms of smokeless fuel, and are being so used?" brought a few valuable replies.

As regards the provision in municipal schemes of heating and cooking methods other than by coal the following are some of the results of the inquiry expressed statistically.

Cookers.

60 local authorities fix gas cookers in *all* houses.

7 local authorities fix gas cookers in *some* houses.

53 local authorities leave it to the tenants' option.

11 local authorities report no provision made for gas cookers.

27 housing societies fix gas cookers in *all* houses.

2 housing societies fix gas cookers in *some* houses.

5 leave it to the tenants' option.

Taking the local authorities and housing societies together, 54 reported that gas cookers were fixed free of charge and 40 that a charge was made for hire. That would be a matter for the local gas undertaking, whether municipal or not, to decide.

As regards electric cookers, no local authority supplies them as a routine matter in *all* houses. Manchester Corporation fixes electric grillers (free) in all blocks of flats intended for re-housing tenants from slum clearance areas, but this is in addition to a coal range with oven and boiler. Their general rule for *cottages* is gas

cookers (also free) in addition to coal ranges. Eleven local authorities report that they install electric cookers in a proportion of their houses; one housing society does the same. Thirty-five local authorities and six housing societies leave it to the tenant's option. Giving tenants an option in the matter of using gas or electric cookers implies the presence of gas or electric points in the kitchen. It was found that the number of these fixed was considerably in excess of the actual number of cookers installed.

Fires.

The amount of heating in bedrooms in working-class houses (to which the inquiry was confined) is not sufficient to pollute the air to any appreciable extent even if coal is used. It is usually only in illness that bedroom fires are lighted. If this is of any duration tenants find that electricity and gas are both very expensive. It is probably for this reason that some of the replies shew there has been a reversion to coal from the gas fires fixed in bedrooms in many early municipal housing schemes. The replies concerning the use of gas fires shew that

14 local authorities fix bedroom gas fires in *all* houses.

29 local authorities fix bedroom gas fires in *some* houses.

57 local authorities do not fix gas fires in bedrooms while

16 state that the matter is left to the tenant's option.

Proportionately to the total number of replies received the housing societies make more use of gas for heating bedrooms, eight out of 34 record that gas fires are fixed in the bedrooms of all their houses and 5 say they are fixed in some rooms of their houses.

As regards electric fires 10 local authorities report fixing them in some of their houses and 19 that they can be supplied at the tenant's option. One housing society fixes electric fires in all their flats, 4 societies leave them to the tenant's option.

A great many local authorities fix gas or electric points in a varying number of rooms thus making it possible for the tenant to equip himself with smokeless heating for bedrooms (and the parlour if the house has one) without much expense should he prefer it to coal fires.

The method of heating wash boilers was not included in the questions as it was considered their use was too occasional to make them important. The information was however volunteered in some cases and it appears that gas is the fuel most commonly used. In London, where a hot-water circulation from a boiler at the back of the living room fire is not common as in provincial towns, the wash boiler is of more importance because it supplies the bath. It is a little surprising to find that the London County Council has supplied coal-fired coppers in the majority of the houses built by them.



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Pre-payment Meters.

It is well known that quarterly bills are an embarrassment to people of small means, and it is not likely that tenants who have been used to buying coal in cwt. bags as they required it will take kindly to a system which involves their paying out considerable sums of money at long intervals, still less when they are in the dark as to how the bills are mounting up. There is no doubt that the automatic pre-payment meter has played a large part in making gas popular for cooking. That the same facility was not available in the case of electricity has hitherto hindered its fuller use in working-class households. Fortunately it appears from the answers to the inquiry that the electricity undertakings are now making this concession in increasing numbers, as will be seen from the table below :—

Pre-payment Meters					
Gas			Electricity		
Yes ..	..	137	..	..	113
Optional ..	..	9	..	..	7
No ..	..	6	..	..	27

(In this table answers from local authorities and voluntary societies are grouped together.)

Two-part Tariffs.

In contrast to the delay in introducing "slot meter" payments for electrical current consumed that industry is far ahead with the 2-part tariff. Out of a total of 167 replies received 67 stated that the 2-part tariff system was available for tenants. Even the poorer tenants in re-housing schemes are finding it possible to use electricity for heating and cooking on this system. Examples of the various scales of charges may be of interest.

London County Council Area. Fixed charge of 10d. to 1/2 a week, according to the supply authority, plus a unit charge, generally ½d.

Manchester. (Corporation Flats). Fixed charge 7d. a week, current ½d. per unit. Equipment (griller, kettle, wash boiler, electric inset fire) free.

Leeds. 10% of rateable value (minimum 30/- per annum) plus ½d. per unit for all current consumed.

Westminster. (Flats erected by Housing Trust). Fixed charge 1/6 per week (which apparently includes rent of cooker) and ¾d. a unit for current.

St. Pancras. (Charges for flats built by St. Pancras House Improvement Society). Fixed charge 5d. a week plus 1/4 per week for hire of apparatus (including cooker, water-heater, portable fire, iron and copper) : current ½d. per unit in winter, ¾d. in summer.

Middleton, Lancs. 15% of net rateable value (minimum 36/- a year) and ½d. per unit.

Farnworth, Lancs. For houses with 6 rooms and under fixed charge of 1d. per day, collected weekly, and a unit charge of ½d.

Dagenham. Fixed charge of 1/- per week and ¾d. a unit.

Beckenham. Fixed charge 11d. to 1/1 per week plus ¾d. unit in summer and 1d. in winter.

Chelmsford. Minimum charge of £3 for 200 units ; ¾d. per unit after 200.

Blackburn. 20% of rateable value plus ½d. per unit ; or 1/- per week for 126 units a year plus ½d. a unit after.

These are fairly representative of the charges quoted in the replies. Where the fixed charge is a percentage of the rateable value it is not always stated what that amounts to, but it appears that a range of 30/- to £2 per annum may be estimated. The charges vary considerably ; in certain cases only will they be within the reach of the poorer tenants, but a fixed charge of not more than 7d. per week with current at ½d. a unit does, it is claimed, render cooking and intermittent heating by electricity possible for them. There will be hire charges for apparatus in addition. (Manchester Corporation is the only instance where cooking apparatus is said to be supplied free, and that concession only applies to the flats for re-housing under the 1935 Act). Some of the charges quoted above could only be paid by relatively prosperous tenants. There is a further point : where the fixed charge can be collected weekly, preferably with the rent, the tenant is much more likely to consider electricity as a practicable proposition, for while 1d. a day and 30/- a year may be identical so far as arithmetic is concerned, they are very different psychologically. A further point in favour of the two-part tariff is that the tenant gets his electric light, for which he will have to pay in any case in the majority of new houses, at a very much lower price than he would pay for electricity for lighting only.*

Much more recently a two-part tariff for gas has been introduced by a few of the gas undertakings, and this should increase greatly the use of gas for water-heating and room heating. The popularity of gas for cooking is of long-standing. The following are examples of the scales of charges given in replies to the questionnaire :—

Burnley. Fixed charge of 6/6 per room per annum (minimum 36/- p.a.) ; gas at 1/8 per 1000 cu. ft.

Chesterfield. Fixed charge of 10/- per quarter ; gas 5d. per therm.

Ellesmere Port. Fixed charge of 1/- for each £1 of rateable value (up to £40) ; gas at 7d. per therm, 2/5½ per 1000 cu. ft.

Newcastle-upon-Tyne. Fixed charge of 10/- per quarter ; gas 5.4d. per therm.

Rotherham. Fixed charge of 1/- per week ; gas at 10d. per 1000 cu. ft.

Summarizing the position as regards gas and electricity it appears from the replies received that in only a small minimum of cases are tenants wholly dependent on coal for cooking and heating. One coal range or grate is

* The Secretary of Wrexham Tenants Ltd. states that the average cost of electricity over about 40 houses using electric cookers is 2/2 per week which includes hire of cooker 6/- a quarter and wash boiler 2/3 a quarter and the usual lighting. Tariff basis generally 15 % of Annual Rateable Value plus ¾d. per unit for first 50 units per quarter and ½d. per unit for all in excess of 50.

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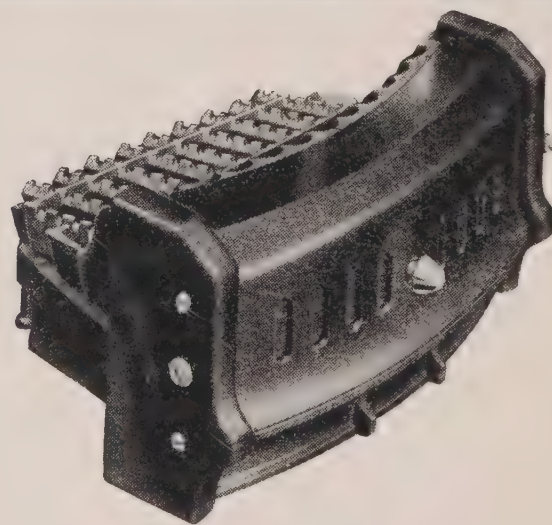
Width 3ft. 11 $\frac{3}{4}$ ins. Depth 2ft. 0 $\frac{1}{2}$ in.
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fixed in every house but there is almost always some alternative smokeless method. In some areas gas and electricity are still at prohibitive prices, but local authorities have been wise to equip their houses with electric and/or gas points in view of lowered prices in the future.

Opinions are conflicting as to the extent to which the poorer tenants find these two sources of heat within their means. Undoubtedly when an open fire is in use for room warming economy demands that it shall also perform some cooking operations, and, if a back boiler is fixed, heat water for sink and bath taps. Some replies inform us that tenants like an open fire but prefer to cook by gas or electricity. It is remarked also that in some mining districts gas cookers are fixed although miners get free coal allowances. In summer time even miners' wives probably prefer gas as more convenient. From some replies one gathers that in the houses now being built for rehousing people from slum areas an increasing use of gas and/or electricity is being made. From this one may fairly conclude that the gas and electricity undertakings, both municipal and companies, are adopting systems of charge which will meet the convenience of people with small weekly incomes and be understood by them. Instruction in the use of electricity, financial as well as practical, is sometimes necessary, though it is surprising with what readiness and success some tenants accustomed only to very primitive methods take to electrical cooking.

The Crux of the Situation.

Though one may assume that great and increasing use is made of gas and electricity in new houses, and that all or nearly all of these are provided with the essentials for using one or both when present or future tenants so desire—or local prices make it possible—there yet remains the fact that all houses have one open fire which is in use for the greater part of the year, in some districts all the year.

The most interesting replies to the questionnaire, although they are relatively few, are those that record experiments (in one case, Leeds, it is more than experimental) with coke-burning grates. The course of wisdom is not to attempt to abolish the open fire but so to construct it that it will burn smokeless fuel. Ordinary open grates are suitable for low temperature carbonization cokes, but with other forms of smokeless fuel, e.g. gas coke and anthracite coals, it is not always easy to start the fires and keep them burning brightly.

For the successful use of these fuels more draught is necessary than with coal, and gas ignition, either by means of a gas poker or jets placed below the fuel bed, is a great advantage not only for starting the fire but for getting it up if it burns dead through lack of attention.

The following local authorities state that they are installing coke-burning grates on a large scale, or small, (experimentally) :—

Halifax. Gas-ignited coke fires in about 200 houses. It is stated in the reply that sufficient time has not yet elapsed for a satisfactory test. (In this town there are special facilities for buying gas coke in small quantities ; 3d. bags are sold over shop counters.)

Stockport. 208 houses fitted with coke-burning gas-lighted fires.

Widnes. "We are now fitting kitchen grates in our houses which will burn coke or coal. The gas works supply small broken coke in bags of 78lbs., at 10d. a bag, or in cwt. bags at 1/3."

Middleton, Lancs. Twelve houses equipped with combination coke ranges, but the experiment has not been tested long enough for a report as to its success to be made.

Salford Housing Ltd. (Public Utility Society) is putting gas-coke ranges in 71 flats now being built. "Generous storage accommodation provided."

London County Council. "In about a dozen cases living rooms have been fitted with coke-burning grates as an experiment."

Bury, Lancs., has made a small experiment with gas ignited coke fires in 7 houses. "Tenants at first used coal and had to be persuaded to try coke."

Bethnal Green Housing Association Ltd. has tried a few slow combustion stoves in the living rooms of some of their new flats. The tenants seem to appreciate them.

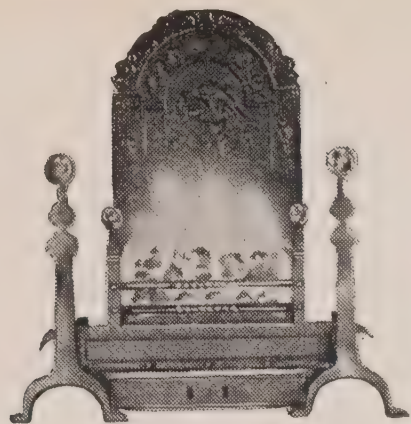
Manchester Corporation is about to try an experiment with gas-ignited coke-fires in 50 houses.

The fullest information relating to the use of coke grates comes from Leeds where from 1935 onwards the proviso has been made that "all ranges installed in Corporation houses must be suitable for coal or coke." The Housing Director stated in his reply that although the organisation for the delivery of coke was not yet complete, a considerable number of tenants were availing themselves of its use. "They did not experience the slightest difficulty in getting either oven heat or hot water with its use."

Conclusions.

The most fruitful result from the inquiry appears to be the recognition on the part of certain local authorities and voluntary housing societies that since one open fire per house must be conceded steps should be taken to render that fire innocuous, if not immediately, then in the near future, by fixing such grates as will readily consume smokeless fuel. Four consequential points arise for consideration.

Firstly, if a general recommendation is made that all grates fixed in new houses should be available for coke as well as coal it is essential that they should not be wasteful when burning the latter. It is not to be expected that all tenants will begin to use coke at once though it is cheaper than coal ; further there may be



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local difficulties in obtaining supplies, and in any case the solid smokeless fuels although there are now several kinds on the market are not yet sufficiently plentiful to supply all the households in the country. It is very necessary therefore that the greater draught which is essential for burning coke should be checked if coal is used. From Leeds we are informed that "the greater air area to the fire can be readily overcome by the dampering arrangement"; the grates fitted in the Widnes Corporation houses have "a collapsible bottom which can be used when coal is used and dropped when coke is used." As this is an important point further inquiries were made of manufacturers who are putting coke grates on the market. It appears that while some coke grates have means for checking excessive draught if coal is used others have not. This is a matter which house-builders should bear in mind, for, in looking to a future when all tenants will prefer and be able to burn smokeless fuel, we must avoid compelling them to waste bituminous coal in the immediate present.

Secondly, the smokeless fuels are more bulky than coal, and need more storage room. To the question, "has consideration been given to adequate storage accommodation for smokeless fuels" only a few of the replies were in the affirmative. This is not surprising for houses built with the aid of government subsidy are limited in superficial area, and a large fuel store means space curtailed elsewhere. Moreover only a minority of municipal tenants buy fuel in bulk. The majority buy in small quantities at frequent intervals; for these, and this is the third point, regular delivery in such quantities or the possibility of buying coke or other smokeless fuel at shops in their immediate neighbourhood, are more important considerations. The great majority of the replies under this heading were not satisfactory.

Fourthly, if gas coke is used it must be of good quality, dry and suitably graded for use in domestic fireplaces. There is a field here for useful co-operation between housing authorities and the gas undertakings.

THE NOVEMBER FOGS

SOME STRIKING OBSERVATIONS

The heavy and persistent fogs, chiefly in the north midlands, between 19th and 28th November, 1936, have been discussed in the *Meteorological Magazine* for December, 1936, from which we have taken the liberty of extensively quoting, as follows:

C. W. G. Daking, in the course of a communication referring to the Manchester area, states: "The first signs of fog appeared on Thursday, November 19th as, with pressure steadily rising, a ridge of high pressure began to intensify over the British Isles with its axis approximately north-east to south-west. Visibility during the afternoon of this day fell to 600 yards owing to a light easterly wind which carried smoke from Manchester over the aerodrome. Before midnight the sky cleared and dense fog appeared before 7h. G.M.T. on the 20th. Though the fog on this day decreased in intensity during the mid-day period visibility was consistently below 1,100 yards except for a period of less than an hour about 16h."

"The variations of thickness of the fog are worthy of note. For most of the thick fog period visibility varied from 30 to 150 yards but at times, notably on the night of the 24th and the afternoon and evening of the 27th, visibility at times was 1 to 3 yards, and it was difficult to find one's way on foot, the outline of the kerb alone being really visible. On these occasions, the smoke and dirt in the fog were indescribable, causing it to have a rancid smell whilst evidence of the presence of sulphur-

ous compounds was only too obvious, from the effect they had on the eyes, nose and throat."

"After two or three days of the fog the soot deposit began to get more and more definite and soon everything exposed to the fog was covered by a black wet slime, making even grass and shrubs appear drab (it is impossible to say exactly how their colour was modified). On one day a pilot flying over Liverpool in the fog, while trying to land at Speke Airport, encountered light ice formation, but the ice was almost black. Several cotton mills in this area not equipped with air purifying plant had to close down as the pollution of the air was soiling the yarn as it was being spun."

Respiratory Disease Mortality.

It was expected that such a period of fog would have the customary result of increasing the death rate from respiratory diseases. This has once again unhappily proved to be the case. Figures have been supplied by the Medical Officers of Health for Manchester, Leeds, Liverpool and Salford, and the deaths from respiratory diseases in the four cities, taken together, are as follows:

Week ended.	Deaths
Nov. 7th	61
„ 14th	65
„ 21st	59
„ 28th	116
Dec. 5th	106
„ 12th	87

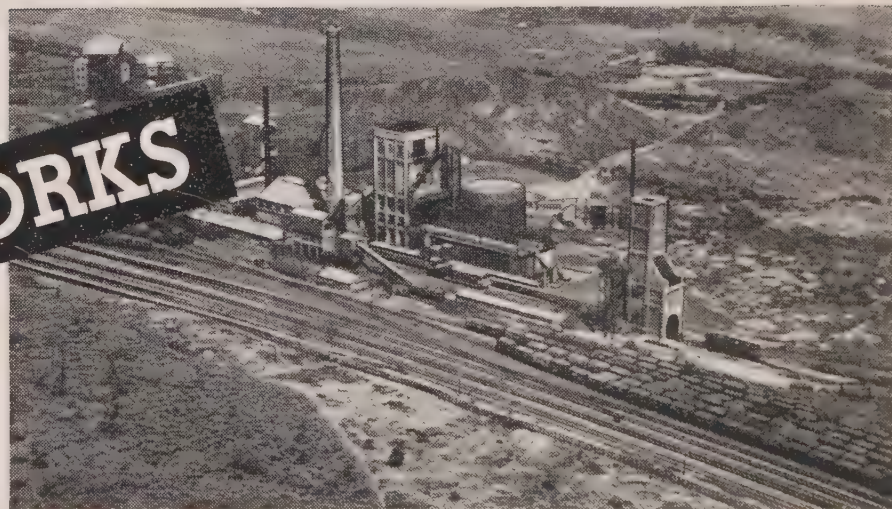
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It will be noted that during the week of the fog and the following week (the usual "lag") the number of deaths was almost double those of the three previous weeks. It is true that during the fog period there was a reduction in the daily mean temperature, but this was not excessive, and did not, except in the case of Salford, fall below 32° F. It may be agreed that the low temperature is possibly another factor contributing to the increased mortality, but the point is that natural fog and low temperatures, without coal smoke, do not cause such remarkable increases in mortality.

Birmingham did not record any increase in deaths, but the following general observations on the effect of smoke upon visibility, made by Mr. Kelley of the Edgbaston Meteorological Observatory, are worthy of record :

"Our own observations show that, on any weekday morning, with a wind velocity less than 4 or 5 m.p.h., the visibility between 6-30 a.m. and 8-30 a.m. is usually reduced 70 to 90 per cent, entirely due to the lighting of domestic fires, the major portion of which are lighted between 7 a.m. and 8 a.m. If the visibility at 6-30 a.m. is 10 miles, it is quite a common occurrence for the visibility to be cut down to 1 or 2 miles, even with a comparatively dry atmosphere, providing the wind is light as already mentioned. As the fires burn clear so the visibility increases, so that between 8-30 a.m. and 10 a.m. there is some improvement. These smoke clouds are usually well defined, as the domestic habits of the majority of the inhabitants of a large town are on similar lines. The definition decreases somewhat during the day, but there is another fairly regular

increase in the smoke cloud between 4 p.m. and 5-30 p.m., no doubt in anticipation of the return of the workers. Officially, fog is recorded when the visibility falls below 1,100 yards."

"Extremely Depressing."

Writing of the recent foggy weather in Birmingham in the *Meteorological Magazine*, J. K. Best, of Bournville states : "At 9 o'clock on the morning of the 21st there was a belt of dense but beautifully white fog at ground level. So shallow was this belt at first that the sunshine recorder, which is on a roof some 80 ft. above ground level, registered 3.8 hours of sunshine during the day.

"It was extremely depressing in the week which followed to see the gradual blackening of the fog owing to the accumulation of Birmingham's products of combustion. What slight breezes there were came from the north-east and aggravated the contamination of the air in so far as Bournville was concerned. Rarely has there been in the Midlands a more striking indication of the need for smoke abatement.

"0.07 in. of rain fell during the afternoon of the 26th. This had a hydrogen ion concentration of 3.0 which is remarkably acid for Bournville. During the week copper and silver articles within doors acquired a lustrous black film within an hour or two of cleaning. Out-of-doors, metals, for example the copper rim of the rain gauge, displayed an unusual black iridescence. Pavements, roads, grass verges, window sills, etc., became intensely sooty within a short time. Housewives, window cleaners and others will have tangible reminders of this visitation for many days."

A LETTER FROM THE PRESIDENT

Dr. Des Voeux writes as follows to those who took part in the Presentation recently made to him :

Pleasurable reactions to the unexpected are delightful sensations, but when these reactions are produced by such a gift accompanied by a beautifully bound and designed inscription full of overwhelming compliments, which I received in October, there is great excuse that I am completely unable to express in words the quivering and continuous gratitude to all those who have done me such an honour, to which only the truly great have any right. I recognize the indulgent and gracious goodwill which has prompted the gift, and feel that it is given as the outward and visible sign that the efforts which I with many others who started the campaign for a "Cleaner Air" in London, are at last assuming an importance which we at that time thought was their due.

Alas ! that those who worked so hard against apathy, ignorance, and even ignominy are no longer here to accept the acknowledgement which is their due, and that I should receive this wonderful token because the lapse of time has left me as their representative.

I thank you all from the bottom of my heart, and only hope that I may live long enough to see the sunshine which we all love brighten the lives of town dwellers, which is under present circumstances impossible.

Yours, with gratitude,

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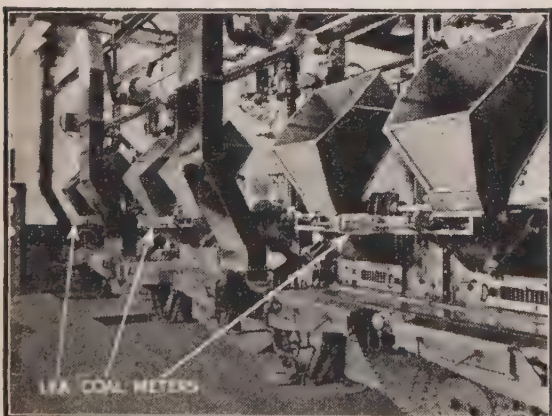
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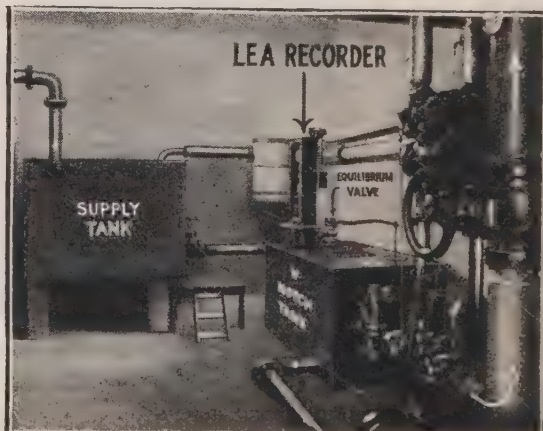


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PROPOSALS FOR SMOKELESS ZONES

Pressure on space prevents the inclusion of the whole of the paper prepared by three members of the Society (Miss Marion Fitzgerald, Charles Gandy and Arnold Marsh) and read at a special meeting convened by the Royal Institute of British Architects at the Science Museum on 26th October.

The paper first considered the domestic smoke problem and the reasons that make it desirable to take special steps to reduce smoke in the centres of our towns by the setting up of what have been described as "smokeless zones." This proposal was the subject of an article in the February, 1936, issue of the *Journal*, which may be taken as an introduction to the following extracts from the second part of the recent paper. These treat the proposal with more detail and go into the pros and cons of the matter as they have been revealed by recent discussion. We should be glad to have the views of readers on what may easily become the most important topic in smoke abatement circles.

The second part of the paper, slightly abbreviated, is as follows :

Control of Smoke Emission.

Any attempt to legislate in regard to the indoor arrangements of that large class of buildings which are privately occupied and not normally open to the visits of inspectors is (so far as smoke is concerned), likely to result in failure. Such indoor arrangements for heating or cooking are the concern of the occupier who should be free to change them as he may think fit. The only matter really concerning the public in the *emission of smoke* from such buildings coming *outdoors into the atmosphere*, and it is against that, and that alone, that smoke abatement legislation should be directed.

This conclusion brings us face to face with the two chief difficulties in regard to the control of domestic and semi-domestic smoke—first, that no general legislation is practicable until substitutes for raw coal are available in sufficient quantity, and secondly that in regard to smoke emission it is difficult to discriminate between existing buildings and new buildings because of the impossibility of adequate supervision by the inspectors responsible for bringing offenders before the Court. We have, therefore, come to the further conclusion that the only effective method of controlling smoke from non-industrial premises is by the establishment of smokeless zones, in other words, by means of byelaws under which smoke emission from such premises could be made a statutory offence, not generally, but only within well-defined areas to be specified in such byelaws. We cannot yet legislate for smokeless cities as a whole, but we can and should legislate for smokeless zones or areas within the city. We particularly suggest that certain city areas should be thus cleared of smoke

emission but the same principle could be applied to other selected areas, e.g. in the vicinity of hospitals, parks, or aerodromes, important architectural monuments, or even to some housing estates.

The Public Health Act, 1936 was a Consolidating Act which passed through Parliament with little public attention and no opportunity was given, or could in a Consolidation Act have been given, for the amending of the byelaws section in regard to which such difficulty has been experienced. We think, however, that the proposal we have put before you is of such importance that in spite of the recent passing of this Consolidation Act it might be embodied in a separate Bill for the consideration of Parliament as an addition either to existing public health legislation or to town planning legislation. The Public Health Act, 1936, comes into operation on the 1st October, 1937, and perhaps a new Public Health (Smoke Abatement) Act might come into operation on the same date. Shortly stated, the proposal we make is that Local Authorities should be empowered by Act of Parliament to make byelaws under which the emission of smoke could be prohibited in certain areas mainly occupied by offices and business premises where the coal fire is almost an anachronism.

The Reasons Summarized.

Our reasons for suggesting that the central areas of cities are immediately suitable to be scheduled as smokeless zones are as follows :—

- (1) The majority of premises in such areas, i.e. large modern blocks of offices and commercial premises, are already equipped with smokeless apparatus. These, while contributing no smoke to the area themselves are adversely affected by their more careless neighbours.
- (2) To occupy for business purposes the central area of a city is in itself a privilege and has accompanying responsibilities.
- (3) In making restrictions which may involve owners or occupiers in additional expense it is advisable to begin with those who can best afford it. The cost of conversion to smokeless methods would generally be very small compared with the rent and rates paid for city premises. In such an area there would not be many of the older type of houses occupied by working class people and these could, if necessary, be exempted. In any case, such houses are tending to disappear under Slum Clearance Schemes. Modern blocks of flats if any such areas can and should be smokeless.
- (4) Central areas are densely populated during daylight hours. A careful estimate was made for the Manchester Corporation of the number of persons who daily come into the city from districts outside the city boundaries and it was calculated that as against a night population

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was over 1,000,000. In addition to the quarter of a million persons coming from outside there are many thousands who come each day from other parts of the city into the central areas, so that a very large proportion of the population only receives such daylight as can reach the centre of the city—nearly one half now shut off by smoke.

(5) The supply of smokeless fuels is at present inadequate for a general substitution of those fuels, and the substitution must be progressive. In starting with the central areas it will be found possible to extend similar regulations to adjoining areas as and when more ample supplies of smokeless fuels are available. Further, as the benefit of such a smokeless zone or area comes to be realised it is likely that the area will be voluntarily extended.

(6) We do not anticipate any difficulty in the case of hotels or clubs. Cooking in such places is mostly done by gas or electricity. The rooms will be warmed by central heating. There is already sufficient good solid smokeless fuel on the market to supply open fires used for cheerfulness in public rooms.

(7) The adoption of smokeless methods by its leading citizens and the possibility of being able to walk through an area without seeing a single smoking chimney would be of the greatest value as an example to others in the city.

(8) The immediate result of the suggested regulations (of which due warning would of course be given) would be that those whose business it is to provide smokeless substitutes would compete with one another to meet the wishes of their customers and to provide the most satisfactory substitutes. This would be a very useful stimulus to industry and employment.

Objections considered.

(a) As against our proposal it will be urged that smoke knows no bounds, and that the prohibiting of smoke within a limited area would be of little practical value. It should, however, be remembered that smoke is of two kinds, the lighter smoke which usually comes from factory chimneys, and the heavier smoke which comes from the domestic or office fireplace and tends to settle especially in calm weather somewhere near its source of emission. Anyone familiar with town life knows how smuts descend from nearby chimneys. It is heavier smoke which chiefly accounts for the blackening of buildings and the destruction of stonework and which is responsible for the more or less constant rain of smuts and a great amount of the dirt contained in local fogs.

(b) Again people say that it is little value to get rid of visible smoke if you substitute for it the invisible fumes from coke or gas fires. This objection is a mistaken one, for the vapour and gases from such fires are quickly dispersed by diffusion or dissolved and precipitated in the natural humidity of the atmosphere.

(c) Another objection is that it would be unfair or undesirable to differentiate between the buildings within such a zone and those outside it. It should, however, be remembered that all Town Planning means differentiation, and that the occupation of valuable sites near the centre of the city is a privilege, in return for which the public are entitled to require that any buildings on such sites shall be particularly free from offence. Again those who are paying for the privilege of occupying premises on these expensive sites and themselves use smokeless methods are particularly entitled to be protected, so far as possible, by the placing of such a restriction on their immediate neighbours. A differentiation possibly more open to criticism is involved in the suggestion that municipal housing estates should be compulsorily "smokeless" but such criticism would be less effective if it were known that a similar restriction had been placed on the (comparatively) wealthy city centre.

(d) Do our proposals interfere unduly with the ordinary liberty of the subject? There are people to whom liberty to put what fuel they please on their own fires seems sacred, but such people forget that the fuel does not remain where it is put and that the enjoyment of unpolluted air and light is itself a fundamental liberty which those in authority should do all in their power to protect.

The Legislation Needed.

As the defining of the areas to which any such regulation as suggested could apply must be a local matter it is clear that the legislation necessary would be of a permissive character, enabling Local Authorities to make byelaws applicable in the specified areas. Any new public health legislation of this sort would of course be read with the existing Public Health Acts and particularly with those provisions which are embodied in S.101 to S.106 of the Public Health Act, 1936, relating to smoke nuisances. For practical purposes it would be convenient that the proposed Bill should provide that the emission of smoke in any area in which the byelaws suggested were in operation, should be deemed a smoke nuisance within the meaning of the section referred to. It would then follow that the same could be dealt with on the lines now familiar in dealing with industrial smoke, i.e. by a notification to the occupier of the premises, an abatement notice and if necessary by proceedings. In any such proceedings the mere emission of smoke would constitute the offence, but it would still be possible for the offender to prove that although some smoke had been emitted the best practicable means for preventing it had been used, having regard to cost and to local conditions and circumstances.

This is probably necessary, as the areas under consideration include several new buildings where heating plants equipped with mechanical stokers using finely divided raw coal may on occasion emit small quantities



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of smoke, although generally inoffensive, and to change such installations would of course be a matter of great expense. In considering whether the best practicable means have been adopted the Court will, however, have regard not only to the apparatus installed, but also to the manner in which such installation is used.

Conclusion.

We respectfully invite the consideration of all the organisations represented here to-day to the proposal which we have outlined before you—and especially we

ask your support in the steps necessary to secure its passing into law without delay. The matter is an exceedingly urgent one if the better planning and development both of our towns and of our countryside is to continue on sound lines, if the many new housing estates spreading everywhere are to be saved from sinking into the old time dinginess, if great monuments such as Westminster Abbey are to be preserved from further needless destruction, and if the many fine works of architecture now in course of erection in so many of the central areas of our cities are not this time to suffer from permanent disfigurement.

THE LIGHT IS SWEET

By JOHN ROBERTS, D.I.C., M.I.Min.E., F.G.S.

(Continued from last issue).

Coal Consumption.

Approximately 220,000,000 tons of coal per annum are mined in this country. About 80,000,000 tons are used at factories and mines, about 30,000,000 for steel making, 18,000,000 in gas making, and 35,000,000 for domestic purposes. About four-fifths of our total consumption consists of raw coal, which in many cases is used with a certain regard for economy and smoke prevention, but unfortunately several large consumers, and many more small consumers, pay little attention to smoke prevention. Indeed, in many cases, judging from the dense volumes of black smoke being evolved from certain chimney stacks, one would imagine that it was the stoker's duty to commit as much waste as possible.

The consumption of coal in London is about 17,000,000 tons per annum, about 5,000,000 tons of which are used at gasworks. The quantity of coal consumed in the raw state is enormous. An appreciable proportion of this is used in factories and power stations equipped with most modern arrangements for the prevention of smoke and sulphur emission, but other factories are far from being blameless. Still, progress is being made, and it is to be hoped that the matter will always be kept in mind by combustion engineers.

"I am Warm, I have seen the Fire."

The average domestic consumer pays comparatively little attention to smoke abatement. His complacency regarding fuel is well expressed in the following: "*He burneth part thereof in the fire; with part thereof he eateth flesh, he roasteth roast, and is satisfied; yea, he warmeth himself, and saith, Aha, I am warm, I have seen the fire.*" (Isa. 44, 16).

Doubtless, the prophet, when he wrote these words or their equivalent, saw visions of twentieth century consumers, with their feet on the fenders, gazing at the climbing and nestling flames ascending from a coal fire, but giving little thought to the fact that four-fifths of the heat energy of the coal was being wasted—only one fifth of it being usefully employed in heating the room. So long as man is warm, he fails to appreciate that this most essential, desirable, comforting, and valuable product is being thrown to the winds, so so speak, the smoke being belched forth to pollute the air of towns and cities. The Englishman in particular has such strong prejudice in favour of the open fire that it makes him oblivious of the waste going on. His satisfaction is doubly great because he has *seen* the fire. Give him a room that is comfortably warm, but which is heated by a "radiator," he will not be satisfied; he must see the fire. Central heating, with its advantages of the absence of smoke, cleanliness, and economy does not appeal to the average Englishman. There is some ground for this prejudice. Convenience and comfort can be obtained with central heating, yet it is not all that can be desired in the English climate. Sir Leonard Hill has pointed out that the *radiant* heat given out from an open fire is more beneficial than heat from hot-water pipes.

The open fire of raw smoky coal is the most wasteful process of coal consumption. Not only is the heat energy being lost, but the smoke evolved is carried into the atmosphere, resulting in injury to health, damage to property, and hindering commerce and industry at the same time. As the open fire is more beneficial to health than central heating, then it appears that what is required is a fuel that may be burnt in open grates,

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but without fouling the atmosphere. A solid smokeless fuel preserves the healthful open fire, and continues to give that satisfaction which results from *seeing* a fire.

What are Fuels ?

All ordinary fuels, whether solid, such as anthracite coal, or coke ; liquid, such as oil or petrol ; or gaseous, such as town gas or producer gas ; have the same main constituents, namely, carbon, hydrogen and oxygen. From these Nature has, by different methods, produced a great variety of results, much in the same way as a clever cook can, from a few simple ingredients, such as flour, sugar, eggs and butter, make a great variety of different dishes.

Fuels may contain also ash, sulphur, etc., but these extra constituents may be regarded as impurities, causing in greater or lesser degree dirt, discomfort, and trouble in burning.

Why Fuels produce Smoke.

No smoke is given off from any fuel if it is completely burned, for in this ideal case only carbon dioxide and water vapour, both colourless, odourless and harmless gases, are produced. To burn a fuel completely, enough air for complete oxidation must be brought into contact with it, and at the same time it must be kept at a temperature high enough for combustion to take place.

This can be done fairly easily with gaseous fuels, which can be mixed with air before ignition, but it is practically impossible with ordinary bituminous house coals. These, when they are put on a fire, decompose at temperatures below their ignition point, and give off a complex mixture of gases and tarry vapours (the volatile content of coal). In contact with incandescent fuel, these may burst into flame, but they usually burn only spasmodically, dying out and depositing soot and tarry matter when they come into contact with relatively cold surfaces. Coal smoke consists of such unburned and partially burned, products, together with dust and ash, which are carried up from the grate and flue with the hot air and gases.

Sulphur Fumes and Soot.

A very objectionable constituent of coal is sulphur, the average content in domestic smoky coal being about $1\frac{1}{2}$ to 2 per cent. This is responsible for the emission of probably 500,000 tons of fumes, consisting of sulphurous and sulphuric acids, into the air of London every year. It is these fumes which play havoc with buildings such as the Houses of Parliament, St. Paul's Cathedral, etc.

It has been estimated that the amount of sulphuric acid produced annually from coal smoke in the British Isles amounts to 3 million tons. which is showered down with the rain.

Sulphuric acid is present also in soot to the extent of from 4 to 8 per cent. in different towns, which soot contains about 40 per cent. of carbon, 10 per cent. of hydrocarbons, about 1 per cent of ammonia and of

hydrochloric acid. London's annual soot-fall amounts to more than 75,000 tons, 6,000 tons of which consists of ammonia, 8,000 tons of sulphates, 3,000 tons of chlorides, and the rest tar and carbon. According to the Ministry of Health Report in 1921, it is estimated that $2\frac{1}{2}$ million tons of soot is evolved from domestic fireplaces, and 500,000 tons from industrial furnaces per annum, representing an annual loss of £6,000,000 in fuel from this cause in London alone.

A " Volcano " of Smoke.

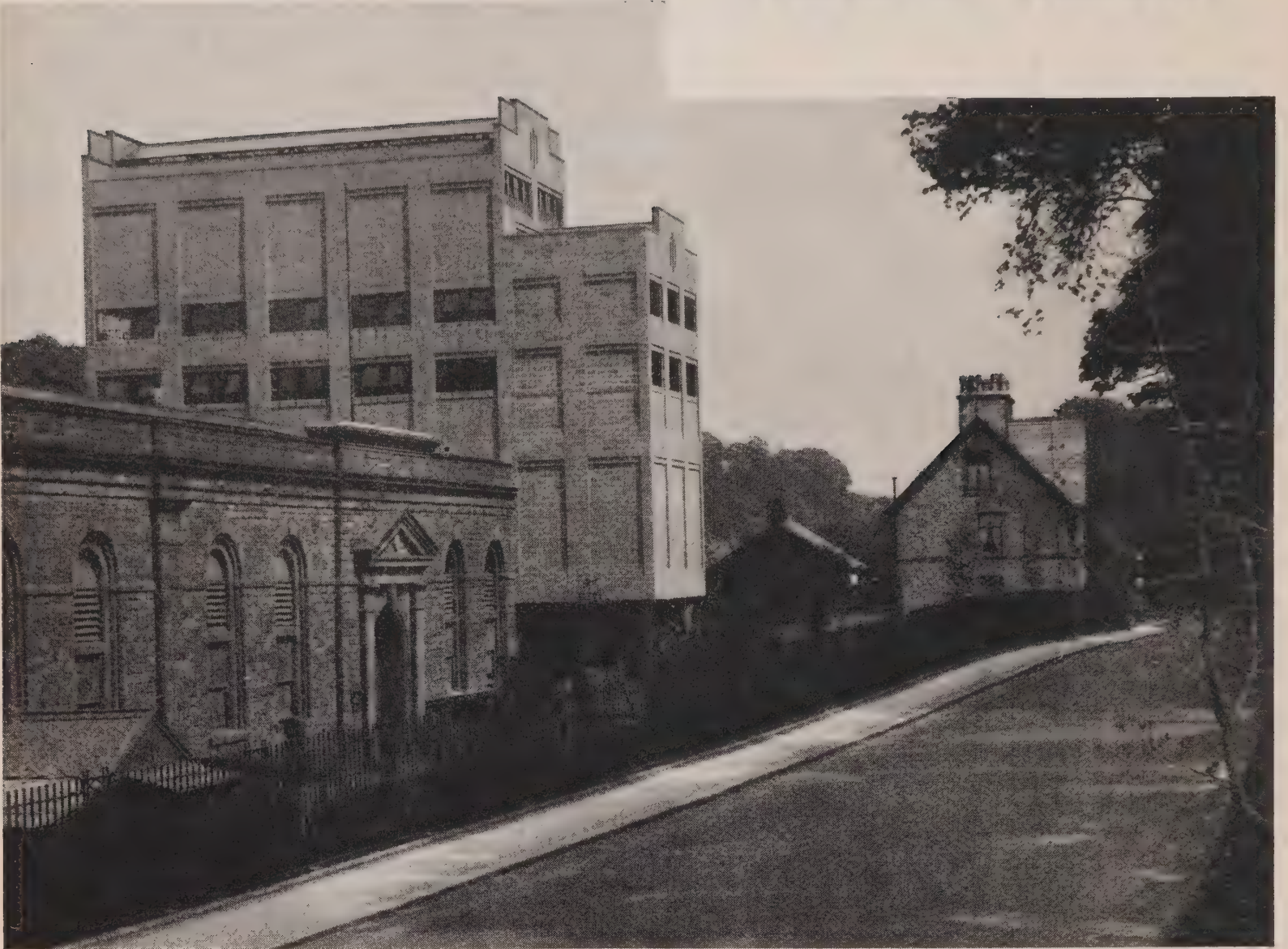
The combined effect of smoke emission from small and large chimneys results in the thick, dirty, pungent, and fatal fogs with which dwellers in London and other large cities and towns are so painfully familiar. In order to try and visualize what this means, assume that 12,000,000 tons per annum of raw coal, containing 30 per cent. of volatile matter, are used in London. This represents 3,600,000 tons of volatiles, or potential smoke. Assuming only half of the volatiles are consumed, it can be calculated that the volume of smoke *per day* exceeds 130,000,000 cubic feet. Imagine this smoke passing up a shaft 25 feet in diameter during 16 hours of the day, the velocity of the cloud would exceed 275 feet per minute. If we picture such a volcano at, say, Picadilly Circus, we have a vivid idea of one of the effects of our wasteful methods of coal consumption.

The value of this " gas " is several millions of pounds per annum. It is an astonishing fact that domestic consumers in Great Britain waste half as much gas as is made by the whole of the British gas companies every year ! The direct loss of millions of pounds per annum in a single town is in itself a serious matter, and the problem is worth tackling vigorously on that score alone. When we add to that the destructive effect of polluting the atmosphere, the waste is magnified considerably. Consider for a moment the cost of artificial lighting resulting from smoke fogs, the damage to buildings, the increased laundry bills, etc., and we see at once how the " snowball " grows. It has been estimated that the increased cost of household washing on account of smoke in Manchester is close on £300,000 per annum, and according to estimates made by the National Smoke Abatement Society, the total annual cost of smoke to this country is probably in the region of £80,000,000. The Society further estimates that in an average town or city the cost represents 9/- in every £1 of the rateable value of the property.

Effect of Smoke on Health.

Smoke fogs are extremely unpleasant to all human beings, but more especially to those suffering from bronchial diseases, and it has been abundantly proved that it often gives the fatal turn to such diseases. In Glasgow, for instance, statistics show that the death rate from these diseases increased from 2.1 per 1,000 in clear weather, to 11.8 per 1,000 during foggy months, whereas in seven other towns in Scotland where there

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was no fog, the increase was from 1.6 to 4.0 during the same periods of the year. Smoke fog is poison to any person suffering from bronchial diseases, and in spite of this fact being well known we are allowed to pollute the atmosphere almost to any extent.

“Then shall it be for a Man to Burn.”

It should be the common aim of all those interested to see that the great gift which Nature has bestowed upon us in the form of coal is used to the best advantage. It should be mined with a minimum of waste, and then applied to industrial and domestic uses in the most economical methods, rather than wasted in the most foul and wilful manner as is being done to-day. Care and system should be exercised in the use of fuel by all classes of consumers, both large and small. Engineers should always get the maximum heat out of the fuel by first adopting the most efficient form of grate or furnace, seeing that as little fuel as possible is thrown away, and that the heat does not pass directly up the chimney, without first being utilized to the best advantage. True economy lies not so much in using sparingly, as in using well.

The domestic consumer should use smokeless fuel, either solid or gaseous, whenever practicable. To the greatest possible extent smoky coal should be converted into smokeless fuel: “*Then shall it be for a man to burn: for he will take thereof, and warm himself . . .*” (Isa. 44, 14).

Individual Responsibility.

In attacking any problem of waste, such as of coal or water, the attitude of the individual is all-important. The tendency is all too frequent for the consumer to under-estimate the value of *his* or *her* contribution. More often than not, he or she forgets that a multitude is composed of individuals, that an ocean—be it of water or fog—consists of a multitude of tiny particles.

In periods of drought we are strictly urged to take every precaution against waste. The most insignificant leaky tap must receive attention. If one tap is allowed to drip at the rate of two drops per second, the quantity going to waste is one ounce per minute, or one pint in 20 minutes, or a gallon in 160 minutes, which equals 9 gallons per 24-hour day. That quantity is a reasonable allowance for the average person's daily requirements. It will be seen, therefore, how simple it becomes to save a matter of 20,000,000 gallons per day in a centre like London, if each individual householder gives the question a moment's thought and attention.

Similarly in regard to smoke abatement. It is a personal matter for the reader, his family, friends and neighbours. Do not make the fatal mistake of assuming that *your* contribution will make no difference. It is *your* bit that matters; you are the multitude! There would be no “ocean” of smoke fog without individuals like yourself each contributing his “drop” into the flood. Remember that 10,000,000 consumers are entitled to think as you think, to act as you act, and to be as indifferent or as attentive as you may be. Your responsibility will now be greater than before, as you will have been convinced of the evils of smoke fog. It is up to you to form the nucleus of a smoke-abatement “snowball,” by first setting an example, and enlisting the interest, on favourable occasions, of those with whom you come into contact. Let your example be such that it will become contagious.

A natural question that arises is: What will it cost in cash, convenience, comfort or time to adopt only smokeless methods of heating and cooking? It will suffice to emphasize that it is significant that those who can least afford to waste money on solid fuel, whether in Great Britain, on the Continent, or in Canada, use smokeless fuels for preference, either coke, semi-coke, anthracite, or smokeless coals.

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REGIONAL COMMITTEE NEWS

Sheffield, Rotherham and District.

The Annual Report of the Committee for the year ended 31st March, 1936, was mentioned in our last issue. The efficient and steady progress of the Committee is again to be observed: thus 7,485 chimneys were observed and no less than 1,000 advisory visits were made. The average smoke emission per hour, as observed, is lowest in the city of Sheffield (2.4 minutes) and highest in one of the outer constituent authorities (3.5 minutes).

The nature of the procedure adopted in relation to offences is shown by the fact that although nearly four hundred intimations and 84 notices were served, only 11 cases were reported to the Committee. Of these the Committee decided that no action should be taken in four cases and that in six other cases warning letters should be sent to the firms concerned. Proceedings were taken against one firm (an iron foundry) and the case was dismissed, the firm stating that the use of coke had abated the nuisance.

Research work has been continued by the Joint Advisory Committee under the Chairmanship of Professor R. V. Wheeler. In conjunction with other bodies research is being carried out on analytical data regarding representative boiler and furnace coals in use in Sheffield and Rotherham; small scale furnace tests of the burning qualities of representative coals; and full-scale trials, at hand-fired boilers, of selected coals to correlate their performance with the analytical and test data previously obtained. Research work was also undertaken on the burning properties of house coals.

The Committee considered the resolution adopted at the Bristol (1935) conference of the National Smoke Abatement Society, in which it was suggested that consideration should be given to the desirability of the qualified exemption enjoyed by certain industries under the Public Health (Smoke Abatement) Act, 1926, being withdrawn. The Committee communicated on this matter to the Minister of Health, and it was subsequently reported that the Minister had not in contemplation the making of a Provisional Order excluding from the application of s. 334 of the Public Health Act, 1875, any process specified in that section as amended by s.1(1)(e) of the Act of 1926.

A report of the Chief Smoke Inspector on gas fumes, fumes from electric melting furnaces, and dust from extractors at works was submitted, and a copy was forwarded to the Home Office, as a result of which the Secretary of State stated that he would welcome collaboration between the Factory Inspectorate and the Officers of the Committee. A meeting was held and the question has been investigated by the Chief Inspector of Factories.

The report of the Chief Smoke Inspector (Mr. James Law) states that increased industrial activity in the area is apparently increasing atmospheric pollution, but that when reconstruction is further advanced improvement in the condition of the atmosphere will be shown.

West Lancashire and Cheshire.

The Runcorn U.D.C. has joined the Committee, making the total number of constituent authorities 20.

The handbook published by the Committee entitled "Smoke Abatement and Fuel Economy in Industry," previously noted in these pages, has had a large circulation, but there are still a number of copies available and can be purchased from the Hon. Secretary, West Lancashire and Cheshire Regional Smoke Abatement Committee, Public Health Department, Municipal Annexe, Dale Street, Liverpool, 2, price 6d. per copy.

Northumberland and Durham.

At a meeting held on 30th November, a full report of the Exhibition and Conference at South Kensington was given by Arnold Marsh, Secretary of the Society. The resolution on smoke nuisances from burning pit heaps, which had been proposed on behalf of the Committee, was particularly discussed.

It is gratifying to note that the course of instruction for firemen and boiler attendants at the Rutherford Technical College, which had to be suspended last year owing to lack of students, has now been resumed with an adequate number of students.

West Riding of Yorkshire.

A further report on analyses of atmospheric dust samples has been published. Plates exposed to the air but protected from rain were the source of the dust analysed, the figures showing that, for example, in the central Leeds area, there was a dust-fall equivalent to 3320 cwt. per square mile per annum. This contained 1.580 cwt. of arsenic oxide, 10.050 cwt. lead, and 1.384 cwt. copper.

The report was discussed at the October, 1936, meeting of the Regional Committee, when it was agreed that as the quantities of injurious metals present in the atmosphere were so small as to be negligible from the point of view of their effect on human health, no useful purpose would be served by pursuing the investigation further. Dr. J. J. Buchan (Bradford) stated that although the investigation might have been negative it had, nevertheless, been worth while as it had added considerably to the knowledge on the subject and was a valuable piece of research.

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NEWS AND VIEWS

A Smoke-Reducing Coal Fire.

A demonstration was given at the C.U.C. Showrooms in London on 13th January of a new fire designed by the Combustion Appliance Makers' Association. The appliance is expressly for the purpose of reducing smoke and was surprisingly simple: a gas nozzle fixed in the grate and passing through a hole in the firebrick side about 6 in. above the grid and two or three inches from the face of the grate. The nozzle inclined downwards at about 40 degrees to the horizontal so that the jet of gas struck the side and upper layers of the coal in the grate and so ignited it.

On account of the high velocity of the gas stream (to quote from a report made by the D.S.I.R. Fuel Research) a considerable amount of turbulence was produced, the latter feature resulting in an indefinite zone of combustion with a number of fluctuating points of flame and some noise.

The appliance is primarily for use in the ignition period of the fire, and it is stated that in igniting the coal the emission of smoke is reduced. It is also claimed that the fire presents a cheerful appearance from the moment of lighting due to the luminous flames playing on the coal. "The smoke consuming action," says the report, "appears to be a combination of the turbulence mixing the volatile matter with air and the combustion of the mixture initiated by the gas flame."

The investigation on the device carried out at the Fuel Research Station showed that there was a smoke reduction of 24% with a caking coal and 52% with a non-caking coal, the greater part taking place during the first 15 minutes while the gas was on. It was also found that the fire burned up slowly after the gas was turned off as the spreading downward of the zone of combustion by conduction and radiation was opposed by convection.

The fire was lit from one side, continues the report, and burned up asymmetrically leaving raw coal on one side of the fire while the other side was well advanced. It was suggested in the report that two igniters of smaller capacity would probably overcome this.

The fire is discussed in the Commentary on page 116.

Smoke Abatement in Oslo.

Recent press reports have stated that the Port of Oslo authorities have decided that all vessels lying at the quay of the port will, in future, be compelled to use Cardiff coals only in order to prevent municipal buildings being blackened. The regulations are expected to come into force within the next six months.

Information kindly supplied to the Society by H.B.M. Consul at Oslo confirms the existence of this byelaw, although it is feared that there will be an outcry when it is enforced.

"The matter became actual," we are informed, "with the building of the new Oslo Town Hall and Central Municipal Offices, a project costing many millions; round this centre a whole slum district has been demolished and a dozen or more very large blocks of offices have been erected. Within a hundred yards or so, the worst offenders against the smoke nuisance are moored. These are the numerous small local passenger and goods steamers and ferry boats which leave the quay every few minutes during the day and even night. They consequently have steam up and are constantly pouring out fumes, smoke and smuts. As the prevailing wind, especially in the summer months, blows the smoke straight on to the buildings some effort will have to be made to stop the trouble."

It is said that there may be a compromise whereby instead of burning a dearer fuel a levy will be made of all the users of the quays concerned, the money raised being earmarked for the periodical cleaning of the buildings affected. We sincerely hope that there will not have to be this compromise, for although by such means the buildings might be kept clean (although hardly undamaged) the money raised could not compensate for the annoyance and destruction caused by the smoke and smuts in countless other ways.

Smoke over Chicago.

Renewed efforts to enforce the city's smoke abatement ordinances have been announced by the city's chief smoke inspector, Frank Chambers.

A relatively new method of combating the evil is also to be tried. By agreement with the Flat Janitors' Union its members are to be given class instruction in furnace management, with city smoke inspectors as teachers. The value of this instruction should be considerable, for recent studies indicate that railroads and industries are no longer the principal offenders. Their place has been taken in recent years by apartments and single family dwellings.—*Chicago Daily Tribune*, quoted from *Smoke*, the Bulletin of the Smoke Prevention Association, Inc.

A Text Book on Combustion.

We have received from Messrs. Babcock and Wilcox, Ltd. a copy of an excellent book on "Principles of Combustion in the Steam Boiler Furnace." Cloth-bound and of 112 pages, this is a handbook much superior to the usual productions of industrial organizations. The chemistry and physical characteristics of combustion processes are treated in full and the computation of combustion data for various classes of fuels is explained. The final chapter gives, by means of detailed examples, the methods used for determining the distribution of losses in a boiler test, i.e., the heat balance.

Sunshine Losses.

The new averages of sunshine and temperature published by the Meteorological Office reveal the influence of industrial and densely-populated conditions upon the amount of sunshine recorded. They show that the industrial area of South Lancashire maintains its reputation for being the duller area in the British Isles.

The average annual duration is 967 hours at Manchester (Oldham Road), 1,029 hours at Whitworth Park, and 1,032 hours at Bolton, giving a daily average of well under three hours. In the duller month, December, the recorded total duration is only seven hours at Oldham Road and thirteen hours at Whitworth Park. We have to go as far north as the Shetlands to find comparable figures in non-industrial areas.

No Smoke Abatement Societies in Moscow.

The absence of the smoke nuisance in Moscow was one of the features of Russia, said Mr. D. V. H. Smith at a meeting of the Glasgow City Business Club. There was no need for smoke abatement societies in Moscow, he said, for there were practically no chimneys, and therefore no smoke. In the centre of the city all houses were warmed by central heating, involving miles of piping from combined power and heating stations.

Russians regarded our methods of heating houses as obsolete as the use of a tallow dip for lighting purposes. **When the Fog Lifted.**

When the fog lifted somewhat in the Spen Valley on Wednesday one could see roads, streets, footpaths,

and walls thick with soot, and windows, doors, doorsteps, and roofs running in black liquid. Householders complained of the dirt, and the quantity of soot about made a good case for efforts towards smoke abatement. —*Cleckheaton Guardian*.

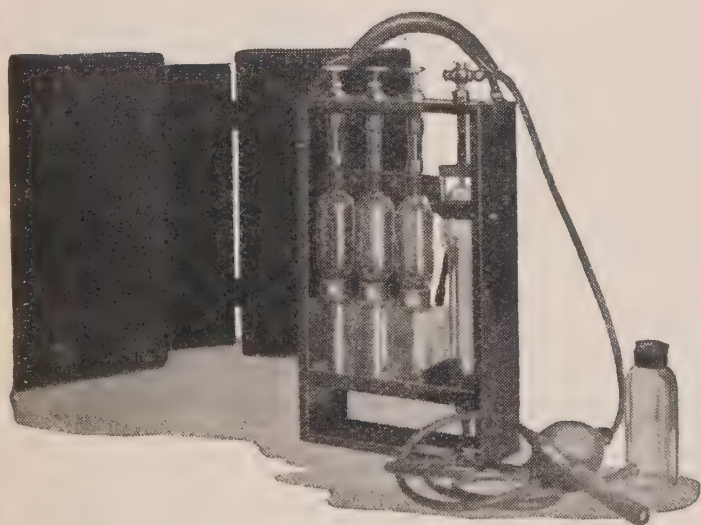
The Fog in Bolton.

As an argument for smoke prevention propaganda last week would want a lot of beating. I have never seen the town look so dirty. Even the grass in the suburbs was no longer green, but was covered by a very obvious deposit of soot, and the Parks Superintendents tells me that never in all his experience has he seen the greenhouses at the Corporation nurseries so dirty. "From the inside you would almost think they had been slated over," he said. And, of course, all the dirt didn't settle on buildings and greenhouses and grass. We breathed tons of it into our lungs. —*Bolton Evening News*.

Loss of Light through Dirt.

An electrical illumination exhibition has followed the smoke abatement exhibition at the Science Museum. One exhibit bears directly upon our own subject: the loss of light due to dirt on fittings, ceilings, and walls. Figures given of investigations show that in three months offices, shops, and schools lost 35% of the available light, domestic premises lost 40%, and industrial premises lost 23%. One of the principal, if not the principal, causes of this dirt is, of course, smoke deposit.

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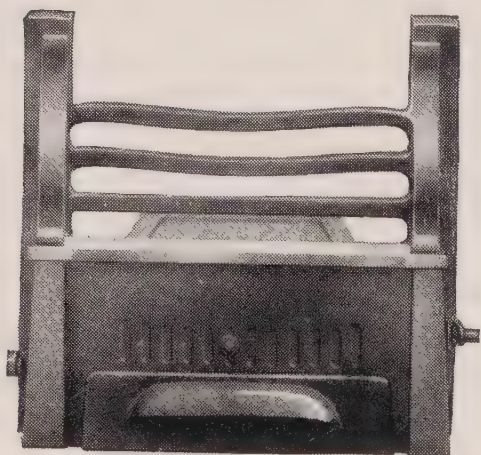
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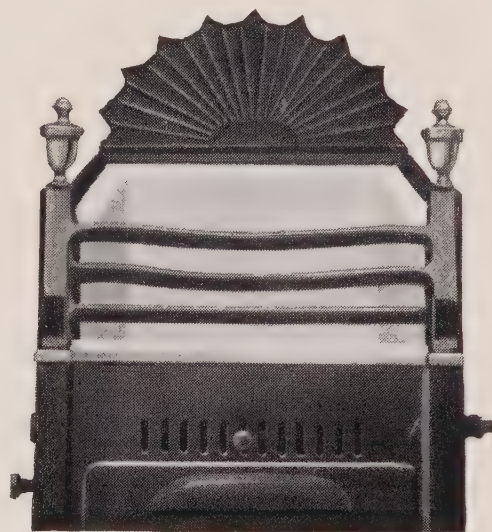
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Photo by A. E. Powell

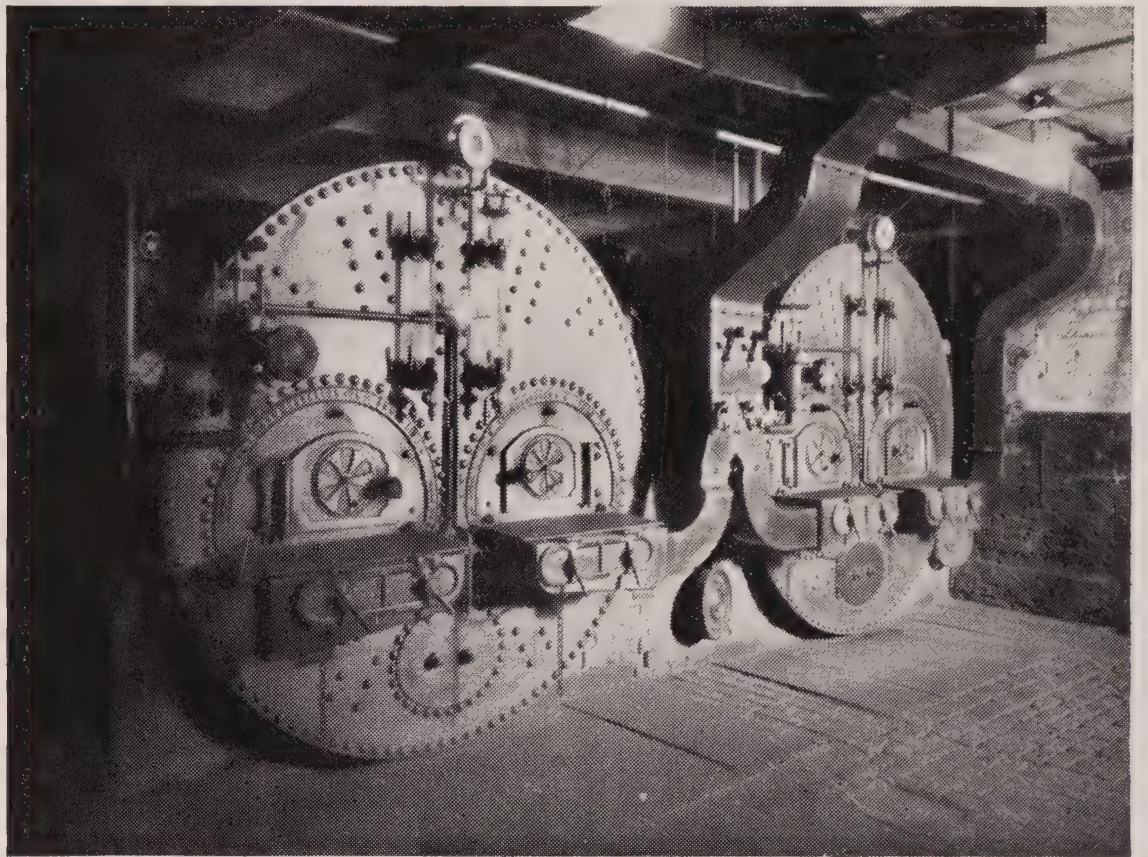
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NO. 30.

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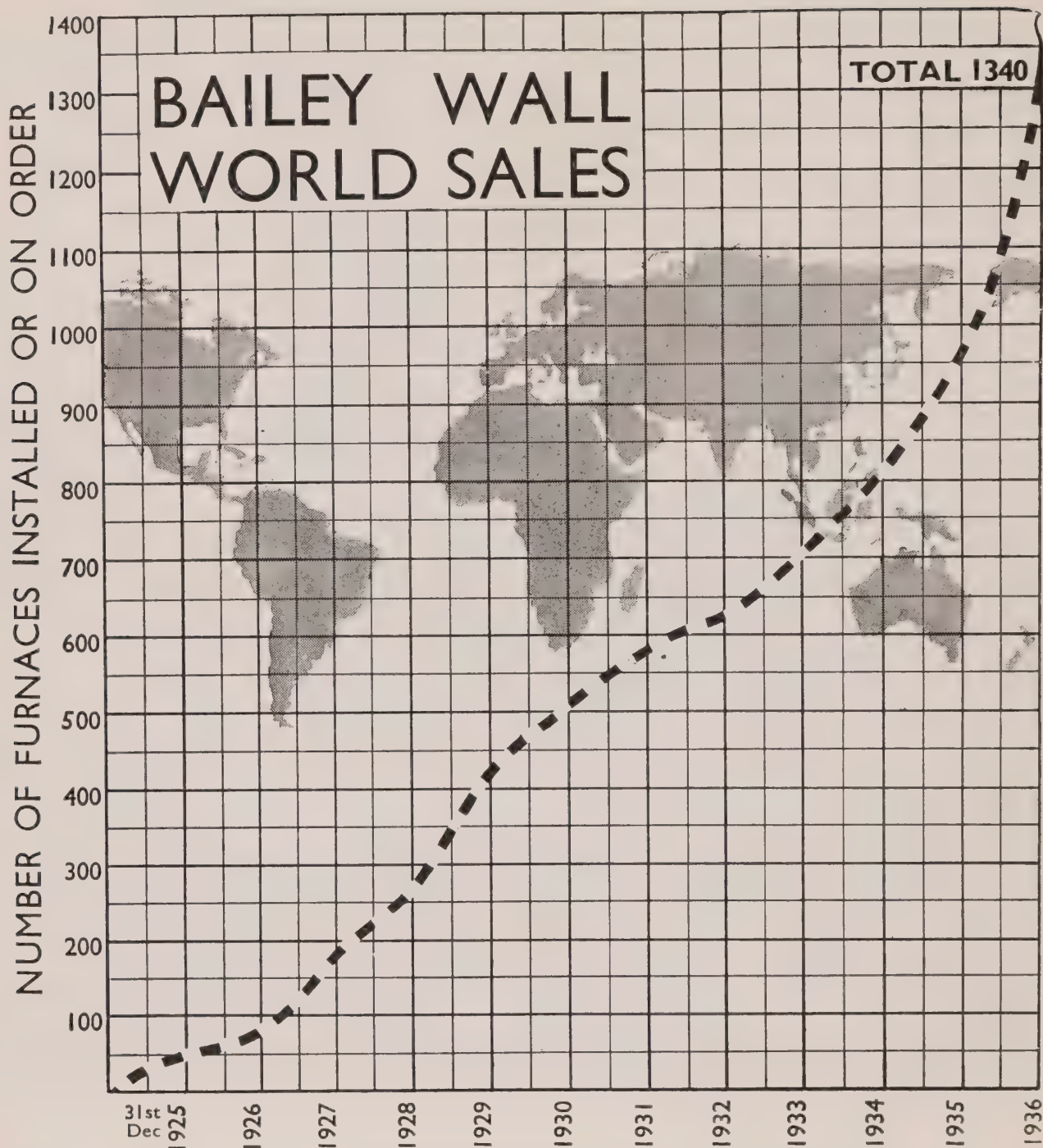


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The Journal is open for free discussion of all aspects of the smoke problem, and the opinions expressed in contributed articles are not necessarily the same as the views of the Society. Quotations and abstraction of matter appearing in the Journal is welcomed, provided the usual acknowledgements are made.

COMMENTARY

FAREWELL Manchester ! As will be read on another page, the Society's offices from the end of June will be in London instead of Manchester. This is an important stage in our history, and it is hoped that events will prove it to be an important step forward. While there are many advantages in our being in London there are nevertheless some disadvantages, and many regrets, in no longer being in Manchester. In many ways Manchester is the home of smoke abatement, and many Mancunians have played notable parts (and some will continue to do so) in transforming a vague public opinion against polluted air into an organization capable of attacking it. Manchester is, indeed, too important to leave altogether ; it has its own flourishing Branch of the Society, will continue to be the meeting place of the Executive Committee, and is, of course, the home of both our Chairman and Hon. Treasurer. And, even though enjoying the milder, but perhaps

little purer air of the city of John Evelyn, which even to-day continues to "wrap her stately head in the Clouds of Smoake and Sulphur, so full of Stink and Darknesse," it may be said that we shall remain Manchester-minded. In the sense, that is, that what the Society thinks about smoke to-day England will think to-morrow (with Scotland perhaps interrupting to say they thought about it yesterday !). The Society has always tried to think nationally, and even in Manchester, has sought to avoid any parochialism. It will continue to do so in London, especially as metropolitan parochialism is an exceedingly grave complaint.

Another city that has been important in the smoke abatement movement is Leeds. Capital of one of the most smoky areas in the country, it is the headquarters of one of the most active Regional Committees, was the centre of the famous

researches of Cohen and Ruston, and has Dr. Johnstone Jervis as its Medical Officer. It is an ideal place for one of our conferences, and we are happy to have received an invitation from the Health Committee to hold our next one there at the end of September. The only questionable point about the matter is why we have not had a conference there before. We are hoping for full and interesting sessions, with naturally a larger proportion of Yorkshiremen than usual, and therefore, in all probability, more trenchant and provoking discussions.

A different type of programme is to be tried on this occasion, and instead of full-length individual papers on different subjects, each meeting will deal with one subject only. The discussion will be opened by short papers by several speakers, each perhaps dealing with one particular aspect of the subject, and these will be followed by contributions from members of the conference generally. In this way it is hoped that all sides of the chosen questions will be considered and that they will then be more fully ventilated and so increase the practical value of the meetings. The probable subjects for Leeds are: the work and organisation of the Regional Committees, the position of the legislation as affected by the Public Health Act, 1936, and "Smokeless Zones." The Conference will open with a reception by the Lord Mayor of Leeds on Thursday evening, September 30th. Friday will see the members hard at work, and on Saturday morning the final session and the annual general meeting of the Society will be held. For the Saturday afternoon the Health Committee of the City Council have kindly invited the conference members to a motor tour into some of the delightful districts which come surprisingly close to the smoke belt of the West Riding.

Another important event may now be announced. A full-size exhibition, to be known as a Smoke Abatement and Fuel Economy Exhibition, is to be held in the City Hall, Manchester, in October.

It is being organized by Messrs. Provincial Exhibitions, Ltd., under the auspices and with the co-operation of the Society. Many members will recollect the similar and most successful exhibitions in the same hall in 1924 and 1929. It will of course be of a type different from the Science Museum Exhibition last year, and will give to manufacturers the opportunity of displaying their products and appliances to the full. Domestic heating and cooking, industrial steam-raising and other processes, smokeless solid fuels, electricity, gas, and oil—it is hoped that everything that can help the progress of smoke abatement will be represented. The scientific and propaganda sides will also be represented and will increase the variety and interest of the Exhibition, and, as before, the Society itself will have a stand to display its exhibits and publications. The exhibition will open on Tuesday, 26th October, and will remain open until the Saturday of the following week.

From the United States of America comes a report of a possible commercial application of the coagulation of particles in a smoke by the action of high frequency sound waves. From a laboratory experiment with ammonium chloride smoke it is predicted, with what validity we do not know, that the apparatus "placed in a factory chimney is expected to prevent it from belching out clouds of soot, and can equally well be used to free a room from tobacco smoke. Bureau of Mines officials expect that it will be applied first in the chimneys of smelting works, where it will save money by recovering small particles of gold or other metals that have gone up in smoke." As the sound waves are audible as a shrill whistle it may be expected that any general application of the device, while pleasing us by reducing smoke, might at the same time incline us to urge our friends of the Anti-Noise League to suppress a new noise nuisance. Nevertheless we shall be interested to learn of the successful application of the principle to the rapidly-moving and heterogeneous smokes of actual industrial practice.

AN IMPORTANT CHANGE

SOCIETY'S HEADQUARTERS TO BE IN LONDON

Members and friends of the National Smoke Abatement Society will be interested to learn that it has been decided by the Executive Committee to transfer the headquarters offices from Manchester to London. The change will be made at the end of June this year.

It is believed that there will be general approval of a step which has been frequently discussed in the past, and that the reasons which have prompted the decision will be appreciated. There are weighty arguments about the excessive centralization of activity in London and the desirability, for many reasons, for its wider and healthier diffusion among the other great cities. But, even if these arguments are accepted, facts as they are have to be acknowledged, and the fact with which we are concerned is that a national organization such as this Society is at a disadvantage in not working from the accredited centre.

Why Manchester ?

It may be of value, especially to newer members, to review why Manchester, rather than London or any other city, should, up to now, have been the headquarters of the movement. London, of course, saw the first organisation to embody the demand for smoke abatement, first in the National Smoke Abatement Institution in 1881, and then, in 1899, in the Coal Smoke Abatement Society. The latter body confined its attention mainly to the metropolitan area, and did a great deal of valuable practical and pioneering work which led to the development of that public opinion which has so steadily grown since those early days. Next, in 1909, a health conference at Sheffield decided to set up an organization for the provinces, and the Smoke Abatement League of Great Britain came into being.

With John W. Graham as Chairman, and Ernest (now Sir Ernest) Simon as Hon. Secretary, both Manchester men, it was natural for the provincial League to have its headquarters in Manchester. After the War the League renewed its work, with many Manchester people on its committees and finding an invaluable treasurer, and later Chairman, in another Manchester man, Alderman Will Melland.

When, in 1929, the League and the London Coal Smoke Abatement Society decided to amalgamate, the League's offices, now with a full-time secretary, became the main office of the new Society. Lack of adequate funds, and the fact that the main support and need for smoke abatement was in the north, resulted in the new national body continuing to work from Manchester.

Why London ?

While the main need for smoke abatement is still in the north, the demand for it and interest in it is now much more widespread than it used to be. Of the 110


Local Authorities affiliated to the Society, 52 are in the north, 14 in the midlands and 44 in the south. It is now a subject not confined to the Society, but in different ways and to varying degrees is the concern of many circles of administration, research, and opinion. It is becoming of increasing importance that we should keep in effective (and stimulating) contact with these circles the centres of which, for good or ill, are to be found mostly in the metropolis. If the Society aspires to be a truly national organization, to lead a truly national movement, it is clear that it must be found where it is expected to be found : it too must have its centre in the metropolis.

Better contacts and due recognition are two of the reasons for making the change. Others are the probability of further examination and discussion of legislative questions, which can be done only in London ; the expedition of many phases of the Society's work ; the probability of new membership and support ; greater accessibility, not only to the many individuals and organisations in London itself, but also to the many people in the provinces who visit London frequently but Manchester, or any other city, but rarely.

For specific journeys, however, Manchester is one of the most central places, and for that reason the meetings of the Executive Committee will continue to be held there. It is generally the most convenient place for members who come from all quarters—Glasgow, Leeds, Liverpool, London, Birmingham, Leicester, etc.

An Appeal.

There is only one doubt about the change : the inevitable one of finance. Expenditure on both office accommodation and expenses and staff salaries will be greater than in Manchester, and, although it is confidently believed that before long this will be counter-balanced by increased support, there is undoubtedly some risk of difficulty at first in balancing the budget. No serious risk is being taken—those who know the Treasurer will understand that—but it is hoped that there will not be even any temporary check in the Society's primary activities. In a year or two's time it is anticipated that there will be a clearly marked upward movement of our income, but an effort will have to be made to make the transfer pay for itself from the start. We therefore appeal to members and friends who feel they can do so, to help us with any additional assistance that is possible. A further appeal to those who already contribute to our funds is not usually desirable, but in this case it is felt that it is justified. A new chapter in the history of the Society is beginning and it must be made to be the most important and most successful yet.



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SMOKE ABATEMENT IN THE MIDLANDS

By GEORGE W. FARQUHARSON,

SENIOR SMOKE INSPECTOR, CITY OF BIRMINGHAM

(From a paper presented to the Midlands Joint Advisory Council for Smoke Abatement).

This question of atmospheric pollution is no new subject. Many words have been written and spoken by experts and others on its deleterious effects upon health, vegetation and stone work, and figures have been produced, showing its enormous cost to the nation, not only to health, but also in labour and waste. This tale has been told over and over again, and what is the result? Some of us believe it, some believe half of it, and the rest, like little Audrey, just laugh and laugh and laugh, but it is no laughing matter for the inhabitants of the densely populated industrial districts who suffer most from this heritage of an industrial era when years ago factories and back-to-back houses adjoining were considered the fashion. I have heard people say, "Oh, those people are immune to that sort of atmosphere." My answer to that is, read some of the heart-rending complaints we receive. Come and visit some of these black spots and inspect this human kippering process of 1937.

Of course, it is not so bad if you live in a garden suburb. It does not affect you much, but even when your neighbour starts to burn his garden refuse and your place gets the full force of the smoke, or you find your office full of soot or grit from a nearby stack, then it becomes a nuisance, and you decide something has got to be done about it. What is actually being done in this City is the point I wish to discuss.

When approaching the question from the Birmingham point of view, such factors as the nature of the pollution dealt with, our geographical position, the numerous trade and manufacturing processes carried on, together with the adaptability and limitation of the legislation, must always be borne in mind.

Nature of Pollution.

Naturally, the greatest form of pollution of the atmosphere is by smoke, industrial and domestic. Next comes solid deposits, such as grit, ash and soot, and finally trade process dust and fumes.

Geographical Position.

Birmingham is built on several hills with corresponding valleys, which act as reservoirs, and it is in these valleys that the smoke haze is so persistent. To a keen observer this haze can be noted for 51 weeks in the year. The only week it is clear in some of the industrial valleys is during the Birmingham holiday week, when most of the factories are closed down and the weather is too warm for domestic fires.

The Manufacturing and Trade Processes.

The city needs no boosting in this respect. Known as the city of a thousand trades, it is essentially an industrial centre and most of these manufacturing and trade processes have some sort of heat unit plant, such as boilers, metallurgical furnaces, ovens, kilns, etc. using coal as fuel, with the result that nearly all the industrial chimneys in the area are potential smoke producers. A census of these chimneys, including such establishments as hospitals, the city baths, etc., taken last year gave the number as 4,768 and if we were to take into consideration all chimneys as defined under the Public Health Smoke Abatement Act, 1926, i.e., the expression 'chimney' includes structures and openings of any kind whatsoever capable of emitting smoke, I think we could safely double our census figure.

Legislation.

Here we have the Birmingham Corporation Act, 1883, Section 30, the Birmingham Corporation Act, 1922, Section 79, the City of Birmingham Bye-Laws, the Public Health Act, 1875, and the Smoke Abatement Act, 1926, and we must not forget those Acts outside this group, such as the Regulation of Railways Act, 1868. In this Act it is necessary to give evidence as a common informer in dealing with smoke from railway engines unless the Local Authority has express statutory powers to deal with such emissions. The Highway and Locomotive Act, 1878, Section 30, is now superceded by the Motor Vehicles Construction and Use Regulations of 1931, Sections 17 and 67. By the use of these Sections steam wagons can be included.

According to Section 92 of the Public Health Act, 1875, it is a moral as well as a legal duty for Local Authorities to enforce the provisions of any Act in force within their district relating to smoke emission. The onus is on the Local Authority to carry out this duty. In Birmingham we carry out our obligations by two methods (a) direct routine, (b) indirect routine.

By direct routine I mean systematic district inspection and observation and when necessary infringements dealt with. In these cases the works or establishment are visited immediately after the recorded observation and a responsible person interviewed—the more responsible the better. The plant is visited and general conditions noted. It is at this point that the Inspector's work begins. Each case has to be dealt with according to its own peculiarity, but in generalizing on conditions to be

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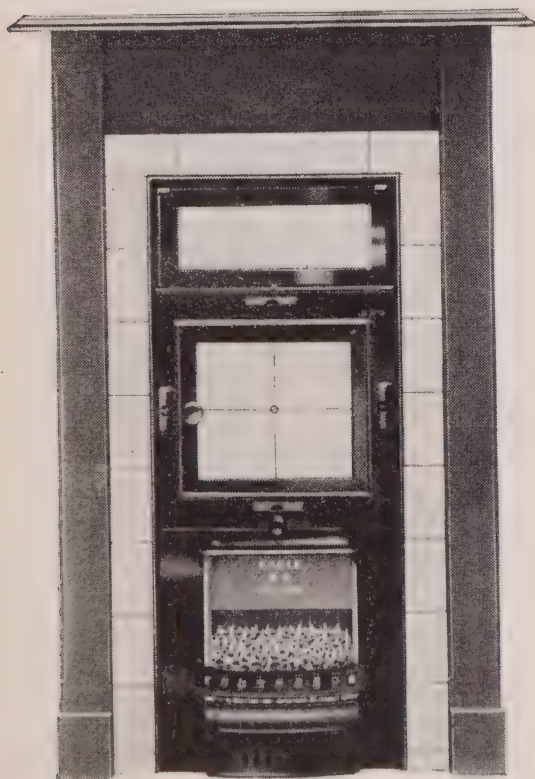
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noted they may be summarized as follows :— Type and use of plant—Fuel in use—Construction and design of the fireplace or furnace—Inspection of fires—Draught conditions, i.e., natural, induced or forced—Information from the furnacemen or stoker as to the working conditions.

After all, in dealing with the products of incomplete combustion, it is at the furnace end where it has got to be tackled to do any good, and it is at this end where an Inspector must have his knowledge in case of legal proceedings. Let me remind you of the first legal wording in the Public Health Act dealing with this subject. "Any fireplace or furnace not so constructed as far as practicable to consume the smoke arising from the combustible used therein, etc." This is an engineering section pure and simple, but it may surprise you when I tell you that last year we had to deal with six badly constructed furnaces. I know there are hurdles in this Section, such as the best practical means defence to be considered in the event of a prosecution, but they are only hurdles and not a Grand National. (Example : Chain grate stoker—no provisions for increasing speed of primary air fan when stoker was on top gear).

Solid Pollution.

Cases of this description come to our knowledge by observations and complaints. The type of detector slides used are simple and effective and have been accepted in Court as convincing evidence. Samples of the deposit are also collected, sealed and labelled in glass bottles, and the same procedure follows, as I have previously mentioned, i.e. visit to the works and interviewing responsible persons, showing them the plates and collected evidence. In recent times some writers on this grit question appeared to be very dubious about taking these cases to Court. Personally, I have found no difficulty in this respect. (Detector slides demonstration given here).

Soot.—Here is a slide showing soot deposits from a metallurgical furnace (low temperature annealing). It was necessary to obtain a Magistrate's Order before abatement of the soot was accomplished. This was the first case of its kind in Birmingham, and, as far as I am aware, the first case in England.

Ash.—This slide shows a wood ash deposit. Lancashire boiler using wood refuse and coal as fuel. A Statutory notice was served. The work carried out and the deposit ceased.

Grit.—Here is a slide showing a grit deposit from water tube boiler plant. After a preliminary notice was served a round table conference between the Managing Director, Chief Engineer, Medical Officer of Health and myself was arranged. The position was thoroughly discussed and the necessary steps taken that proved effective.

Crown Premises.—Here is a slide showing grit deposit from a boiler plant situated on Crown premises. Section II of the Public Health Smoke Abatement Act,

1926, gives the Local Authority powers to deal with such premises. It is the only section of any act relating to Public Health work that I know of, and I have worked most of them, where Crown premises come within the jurisdiction of the Local Authorities. In this particular case it ended up in a sort of conference between the Comptroller of the Buildings, Superintendent Regional Engineer, Divisional Engineer, Medical Officer of Health and myself, also a representative of the Office of Works. The matter was thrashed out, conditions altered, and no further complaints have been received.

Trade Process Dust.—Here are two slides, one showing wood dust deposits from a defective dust collector, and the other showing metallic dust from a defective cyclone apparatus serving grinding and polishing machines. The extracting plants are necessary to comply with the conditions set down for certain scheduled trades under the supervision of H.M. Inspector of Factories. In cases of this description a special letter is sent to the firm and the Chief Inspector of Factories notified. A joint visit is paid by the Factory Inspector and myself, and the matter adjusted in this way.

Fumes.

I do not know of any legal definition of the term "fumes," but taken from the dictionary the word fume means smoke or vapour. Therefore, it is difficult to differentiate one from the other. There are certain registered processes in which fumes are given off and are dealt with by the Inspector of Alkali, etc. Works Regulation Act, and in border-line cases the co-operation and valuable assistance of the Inspector concerned is sought and found to be very useful. Most complaints about fumes deal with metal treatment at scrap metal works. Sometimes the fumes are caused during pouring. In such cases the assistance of the Factory Inspector is again utilised, but where the actual process is subject to combustion conditions, such as swift drying and japanning, the blue fumes given off are treated as smoke.

Trade Refuse Burning.

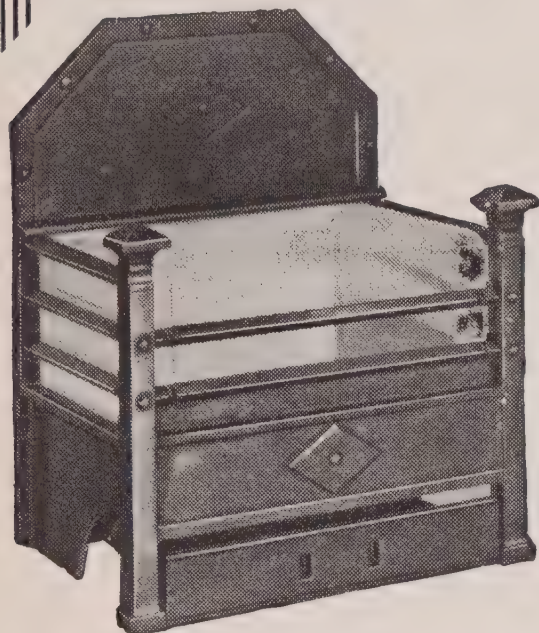
During district inspection considerable indiscriminate burning of trade refuse is often noted. Such cases are dealt with as ordinary nuisances under the Public Health Act, 1875. If refuse must be disposed of by burning, then proper and suitable facilities should be provided for this purpose.

Indirect Routine Methods.

I do not wish to create the impression that I believe in prosecution, I don't. To me prosecution is a failure on my part to convince the persons concerned how to remedy the particular trouble, but of course in some cases it is necessary. I have never yet met with a Birmingham manufacturer of repute who deliberately sets himself out to be an annoyance or nuisance to his neighbours. On the contrary they are sympathetic and in some cases have written to the Medical Officer of

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Health requesting the Smoke Inspector to visit and advise, and it is under this heading of indirect routine that I class such advisory visits. (Example : Victoria Law Courts re prosecution and request to visit.)

Thanks to the co-operation between the City Surveyor and the Medical Officer of Health it has been arranged that outside contractors doing Corporation work shall use anthracite or other smokeless fuel. Another valuable contribution is the arrangement whereby plans of industrial buildings and chimney stacks deposited with the Surveyor are passed on to our Department for observations. By this means records of new and various types of plant together with the height of industrial chimneys, are kept, and the owners or depositors are interviewed from a smoke abatement point of view. This means additional work, but prevention, if possible is better than cure.

Education of the public is spread by means of lectures to Guilds and similar associations. We have no technical classes similar to those run in other cities, such as classes for stokers. I understand that they did not receive a satisfactory response when such classes were advertised. However, lectures and practical demonstrations are given to D.P.H. students, and also to the students taking the practical sanitation courses at the Technical College evening classes.

Domestic Smoke.

Beyond the spreading of propaganda at Guilds and the conversion of those hot-house enthusiasts who persist in burning coal in slow combustion stoves, our powers are limited. The police deal with domestic chimneys on fire, but in my opinion the clearance of congested slum areas from a house density of 70 per acre to re-housing at 18 per acre, the creation of new estates, both municipal and private, the increased

use of gas and electricity for heating and cooking, and the public demand for the modern type of firegrate which is designed on engineering and labour saving principles by the manufacturers of to-day, are all factors helping towards the reduction of domestic smoke. I have not mentioned different types of fuel and central heating arrangements, because we must look facts in the face. The public like their coal fires, and it is in the direction of better combustion at the firegrate end where the remedy must be applied.

Meat, housing inspection, food and drugs, etc. are easy compared with this specialized branch of Public Health work. You have even got to keep chasing up the various departments in your own Local Authority and if they do not show a good example, what argument can you use to the private individual? That is why I say co-operation is a great asset in this work, and, as the Inspector carrying out these duties, I should like to thank my Chairman, the Public Health Committee, the Medical Officer of Health, and the others whom I have mentioned for their support, advice and action towards this question of reducing atmospheric pollution within this City.

In conclusion, the new Public Health Act, 1936, which comes into operation on October 1st, embodies the Public Health Acts, 1875, and the Public Health Smoke Abatement Act, 1926. The expression "any fireplace or furnace" will read "any installation for the combustion of fuel." Statutory Notices will be called Abatement Notices, and the authorised officer must confirm the notification of the occupier of the premises as soon as practicable and do so in writing within 24 hours. Also, the definition of dust does not include dust emitted from a chimney as an ingredient of smoke. These are just a few points which to me will open up new arguments, especially on the legal side.

SMOKE ABATEMENT AND THE SPECIAL AREAS

The Report of the Commissioner for Special Areas, which was presented to Parliament and dated 27th October, 1936, contained the following paragraphs :


"There is one further suggestion regarding the use of Welsh coal which in my view merits examination. It is pointed out above that South Wales has recently failed to keep abreast of other coal fields in the home market, and it seems worth considering how a greater share of this market could be obtained. One direction in which important results might be looked for was suggested by the authors of the 1931 Industrial Survey of South Wales, in which they state 'it would be foolish to ignore the fact that South Wales supplies admirable coals of the smokeless variety which might well be sold on the domestic market at a price at which low temperature coke will not be able to compete for some time. An expert on low temperature carbonization has

declared that he has never yet come across any manufactured fuel which is equal to the natural smokeless fuel, which can be obtained in South Wales and which can be burned in the open grate.' A greater use of this coal domestically, and also for other purposes where possible, would not only be of considerable value in providing employment in the mining areas of South Wales, but would also have the advantage of making a real contribution to smoke abatement. The recent exhibition opened at South Kensington by the Minister of Health showed clearly the great damage to national health and property caused by the smoke which is created mainly by the domestic hearth.

"Increasing pressure is being brought to bear upon manufacturers who have to comply with requirements imposed under the Public Health Acts to reduce the emission of smoke and dust, and plant has often to be

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installed which involves a considerable capital outlay. Is there not a case in the interests of the public for insisting on a similar abatement of smoke from open hearths which causes so much damage and is deleterious to health? I recommend that a start should be made by insisting that all houses over an agreed rateable value should not use in open hearths anything except Welsh or other smokeless coal or fuel.

"The use of Welsh coal for domestic purposes is not suggested as an alternative to the production of smokeless fuels by low temperature carbonization processes. It is frequently stated however, that the demand for these fuels is much greater than the present available supply, and in the South Wales steam coal there exists a vast reserve of smokeless fuel stated to be better than any fuel manufactured by artificial processes, which is unduly high in price."

In the House of Commons.

Major Herbert, speaking in the debate on Special Areas (Money), on March 9th, 1937, said: "One suggestion as to how the Government could help the Welsh coal trade is by using more smokeless coal themselves. I asked a question the other day, and the answer which I received from the Office of Works was that they burnt 40,000 tons of smokeless fuel, 105,000 tons of coke and 125,000 tons of other fuel in the course

of last year. The Smoke Abatement Society and other bodies are entreating us to take steps to preserve the ancient buildings of this country, and so I make the plea, which many Hon. Members will appreciate, for the greater use of smokeless fuel and South Wales coal."

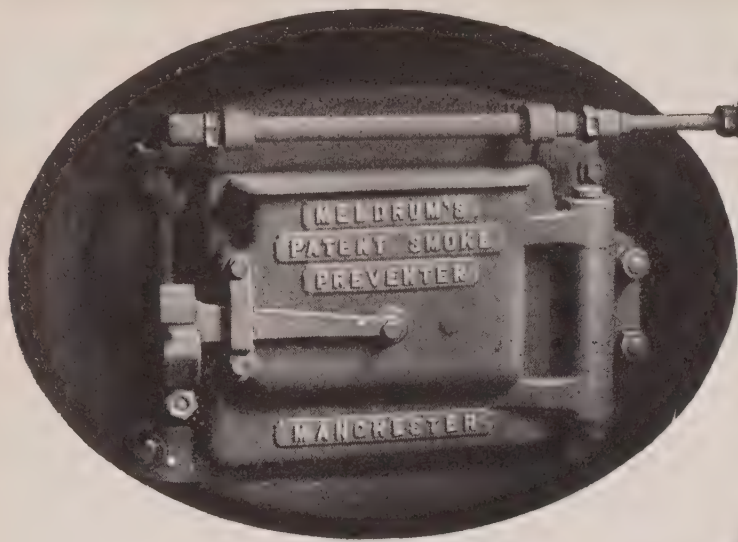
In the debate on the second reading of the Special Areas (Amendment) Bill, on 6th April, Sir Robert Horne said that the low temperature carbonization processes which the Government had induced to go to South Wales had many merits, one being that it produces smokeless fuel; and he looked forward to the day when the burning of any coal which was not smokeless would be prohibited in the City of London.

In a question to the Minister of Health Mr. Parker asked whether, in view of the difficulty of refuting the defence allowed in the case of the emission of smoke, other than black smoke, by section 103, sub-section (3) of the Public Health Act, 1936, and as the said Act, according to the Consolidation Committee, was intended as a preparation for more substantial amendment of the law, he was prepared to take steps to bring the law concerning smoke, other than black smoke, into line with black smoke.

Sir Kingsley Wood said he could not hope that any general measure of agreement would be secured for a proposal of this kind.



Photograph of buildings in Princes Street, Edinburgh, before cleaning. On another page is a similar photograph after they were cleaned.



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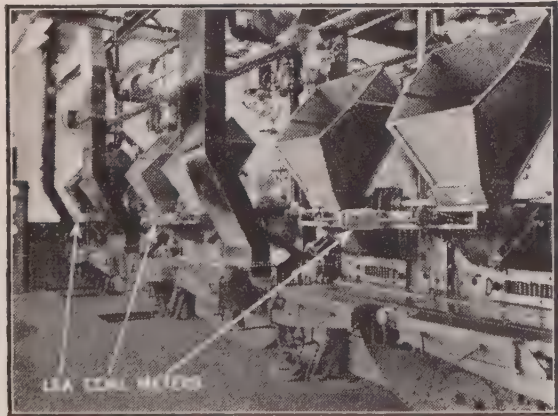
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The Princes Street building after cleaning. This and the previous photograph are taken, by permission, from the last Report of the Sanitary Department of the City and Royal Burgh of Edinburgh.

MRS. MARY HIGGS

We deeply regret to record the death of Mrs. Mary Higgs, of Oldham. Mrs. Higgs, who was 83 years of age, was a member of the Council of the Society, had helped it for many years, and up to recently frequently attended our conferences. Her work for smoke abatement will be for long remembered, especially in Oldham, where she was the founder of the "Beautiful Oldham Society." Although known in Lancashire as "Mrs. Higgs of Oldham" she was in fact a south-country woman, and came to live in Oldham in 1890, where her husband was a Congregational minister.

Some time after her arrival there a letter appeared in the local press under the title "Beautiful Oldham—Why Not?" "It contained," as the obituary notice in *The Manchester Guardian* says, "the audacious suggestion that the dark, grimy, and smoke-palled Lancashire town might, if its citizens only chose, be made a beautiful city." Smoke abatement was of necessity one of the main objectives of the Society which was formed in response to this appeal, and since then it

has worked hard, as Mrs. Higgs herself worked hard, to bring beauty and cleanliness to the town.

This, though, was only one side of Mrs. Higg's busy and valuable life. Her work for improving the lot of the down and out, the tramp, the homeless woman, or the welfare of mothers, was brave, direct, unsparing, and successful. For true knowledge of conditions she on occasion dressed poorly and lived in common lodging houses, Salvation Army hostels, and workhouse tramp-wards. She wrote a number of books and pamphlets and had the satisfaction of often seeing, thanks largely to her own persistent efforts, the reforms she demanded come into being.

We have lost a good friend and a great and irreplaceable worker in Mrs. Higgs. How different a place would England be if more, though but a few, were able to see as she must have seen, learn as she must have learned, and work as the results show she must have worked.

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SMOKE ABATEMENT AND CURRENT EVENTS

Physical Fitness.

At a meeting of the Executive Committee, shortly after the Government had announced the scheme for the encouragement of physical fitness, the following resolution was passed :

“ The Executive Committee of the National Smoke Abatement Society, being largely composed of members actively concerned with Public Health generally, welcomes the Government's scheme for improved physical fitness, but begs to draw attention to the fact that no such scheme can be completely successful while the majority of the population have to spend practically the whole of their lives in air made unhealthy by smoke pollution. As clean air and adequate light are primary necessities for physical health the Committee urges the Government to increase the effectiveness of its plans by giving closer attention to means for improving the condition of the atmosphere of our towns.”

The resolution was communicated to the Prime Minister, the Minister of Health, and the President of the Board of Education.

The Coronation.

The following letter, which was sent to the Press in March, stresses an aspect of our subject which does not always receive sufficient attention.

“ *To the Editor.*

“ Sir : If those concerned would make a co-ordinated effort, the period of the Coronation might reveal, with a minimum of cost, an unusually bright and colourful Britain. The display of flags and other decorations will not be fully effective unless the buildings behind them are thoroughly washed and where necessary, repainted, so that they may present clean faces for the celebrations.

“ The deposit of soot and other atmospheric pollution will, unfortunately, quickly mar this cleanliness, but it is hoped that this consideration will not deter the Municipal Authorities and all others who are responsible for the principal buildings in our towns from arranging an extensive civic “ clean up.” The periodical washing of stonework does much to prevent its decay, and even though the brightness will not last the owners will be repaid by the improved attractiveness of their premises and by the satisfaction that the ravages of smoke have at least been temporarily arrested.

“ Further, an extremely valuable object lesson would be afforded, to those who have not yet considered the subject seriously, of the beauty and brightness lost to us by the perpetual pall of smoke which hangs over our populated areas. In order that the efforts of those cleaning or painting their buildings may receive encouragement, is it too much to ask that all who possibly can do so should endeavour to minimise the emission of smoke during the month of May ?

“ Manufacturers, the railways, and the occupiers of buildings in the centres of our towns (where there are still too many unnecessary smoky chimneys), could materially help in keeping the sky clear and the air clean. After all, it is a poor display of national rejoicing if our towns cannot make an effort to shake off, even if only for a month, their customary smoke-engendered gloom and drabness.”

The letter was signed by Mr. Charles Gandy, Chairman of the Executive Committee, and a letter in similar terms was sent also to the Lord Mayors and Mayors of the principal towns, asking them to do what they could to encourage smoke prevention during May.

REGIONAL COMMITTEE NEWS

Manchester and District.

The proposal to form a Joint Smoke Abatement Board for South-East Lancashire is still receiving the attention of the Committee. It is probable that a considerable amount of support will be forthcoming when the proposal is brought forward again as a result of interviews which representatives of the Committee have had with representatives of some of the local authorities concerned. It is hoped that a meeting of representatives of all the local authorities within the regional area will be arranged shortly.

Mr. N. S. Duguid represented the Committee at an important conference held at the Ministry of Health in October last which was attended by representatives of the Ministry, the Alkali Department, and Regional Smoke Abatement Committees. Some of the subjects under discussion were : employment of qualified smoke inspectors ; advantages of an “ Executive ” compared with an Advisory Committee ; use of instruments as an aid to smoke observations ; byelaw for black smoke, and smoke other than black and grit ; the extent of the grit nuisance, etc. ; and determination of exemptions under the Act of 1926 (Section I.I.E.)



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The Committee passed and forwarded to the Ministry of Health a resolution stating that the time had now arrived when serious consideration should be given to the desirability of the qualified exemption enjoyed by certain industries under the 1926 Act being withdrawn.

Courses in connection with boiler practice are again being held at the Manchester College of Technology and these are being well attended. Certificates will be awarded by the Regional Committee to the successful students at the examination at the end of the elementary course which is specially arranged for boiler firemen, and the more advanced course which leads up to the City and Guilds of London Institute Examination. An elementary class is also being held at Warrington under the auspices of the Health Committee there, and the Regional Committee is arranging for an examination and those who pass will be awarded certificates by this Committee.

Sheffield, Rotherham, and District.

The past three months have shown increased activity in both the coal and steel industries and most of the collieries and works are now on maximum output.

This increase in trade tends toward greater atmospheric pollution, but with the exception of two or three places it can be stated that the amount of smoke emitted is not greatly in excess of normal working. The heavier trades are showing a remarkable example of what can be done in the manufacture of steel with a minimum of smoke. The more extensive use of gas and electricity is having the desired effect; in fact, at present, the supplies of gas are being utilised to their limit and the daily consumption is estimated at 36 million cubic feet. In addition to this a number of works are using producer gas which they manufacture at the works.

The use of pulverized fuel is being extended and though reports of its use for process work are in the majority satisfactory, it would appear to be premature to make any definite statements with regard to the possibility of its development on a more extensive scale.

One colliery company is pulverizing the fuel at the pithead and delivering it to the works in special vehicles, the fuel being discharged by means of compressed air from the conveyor to the fuel bunkers. This is considered as an innovation, the usual methods being to provide unit pulverizers for each furnace.

The use of electricity for power, steel melting, and heat treatment processes is advancing steadily, certain works having reconstruction schemes in progress which will eventually eliminate the generation of steam at the works for the production of power. The large electrical power stations are all engaged in reconstruction work,

installing large high pressure boilers working at 600 pounds pressure per square inch in lieu of the older small low pressure units.

A considerable amount of reconstruction work remains to be carried out, but manufacturers are showing a desire to help and co-operate in order to obtain increased output and efficiency as well as to prevent the pollution of the atmosphere.

Although gas and electricity can be obtained at prices which compare favourably with those in other manufacturing centres, the price of coal is also comparatively low and when used in conjunction with poor and obsolete plant the results give rise to considerable nuisance.

There is a feeling of optimism for the future throughout the district and if this will continue, together with the spirit of co-operation to assist in the prevention of pollution, much can be achieved towards the aims of the Committee to make Sheffield, Rotherham and District a comparatively clean part of industrial England.

Northumberland and Durham.

For some time past a course of instruction for firemen and boiler attendants has been successfully conducted at Rutherford College, Newcastle-upon-Tyne, while a similar course of lectures was started at Sunderland this winter session. These two centres, however, are not conveniently situated for students from certain parts of Durham County, and at the request of the Northumberland and Durham Advisory Regional Smoke Abatement Committee, the Durham County Education Committee is to explore the possibility of such courses being run at Stockton-on-Tees, Durham and Consett.

West Riding of Yorkshire.

The question of burning spoil banks was discussed at a recent meeting of the Committee, and the general opinion was that the number of these in the West Riding had increased considerably during the last five years and would be likely to continue to increase as a result of the new methods of coal-getting, which were being used in the collieries. In addition to this the fact that the material was being dumped on the surface and was not being "packed" in the workings was increasing the danger of subsidences.

A resolution in the following terms was passed: "That the Honorary Secretary be instructed to bring the matter in all its bearings to the notice of the Minister of Health, with the request that he give it his earnest consideration."

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SMOKELESS FUEL DEVELOPMENTS

NEW PLANT OPENED AT BOLSOVER

The world's largest low temperature carbonization plant was opened by the Duke of Kent at Bolsover, Derbyshire, on April 14th. This is the fourth plant of Low Temperature Carbonisation Ltd., the manufacturers of "Coalite," and has a daily throughput of 500 tons of coal.

Before declaring the plant open, the Duke of Kent reminded the audience that coal had been worked in the district since the 14th century, and soon after 1600 coke made from Derbyshire coal by low temperature carbonization was used in the malting industry.

Engineering was continually developing and seeking new fields and new methods, and in doing that the substance they knew as oil had played an extremely important part. With the process used in that works, which he was proud to know had been entirely devised and perfected by British chemists and engineers, they had the means whereby the oil contained in their seams of coal could be extracted at an economic cost.

"At the same time," continued the Duke, "we can provide ourselves with a first-class smokeless fuel, the use of which will do much to enable us to minimize the evils of smoke pollution from which we have suffered for so many years."

"From a national point of view also the works must be regarded as a material contribution to the progress of the mining industry and the production of some of our oil requirements from our own resources. The country is keenly interested in these developments, and views with sympathy and approval the great strides this new industry is making."

In thanking the Duke, Colonel Bristow, Chairman and Managing Director of the Company, said that they were negotiating for further supplies of coal, and if successful next year they proposed to increase the works by 50 per cent. That would raise their supply of coal from 500 tons a day to 750 tons.

In addition they were placing a contract for further works on the other side of the road, where they would undertake the distillation of oil and new chemical products. Those works would cost £200,000, and would be finished by the end of the year.

They were putting up a similar plant in South Wales, and a similar oil distillation plant, and had bought a colliery there in order to secure ample supplies of coal. (Laughter). That would make five Coalite works in different parts of the country making smokeless fuel, oil, petrol, and many other things. What did that mean? Where was it going to stop? At the dinner to the Prime Minister the night before he had been struck

by a phrase of Sir Robert Horne's, "They hitched their waggon to a star," because that was very largely the policy of the directors of that company. They had embarked on that enterprise and were not abashed by any of the difficulties and were fully determined to make the utmost possible use they could of coal.

It was very significant that in nearly all the processes for the more scientific use of coal the first thing that happened was that not so much coal was wanted. That was not exactly encouraging to the mining industry. But in their process they required more coal, not less.

They all knew how vital oil was, how it had become the key to the security of this country. The Company could hardly hope, at least for a long time to come, to manufacture all our needs, but they could do much, and it was their aim to go on using our great coal resources for that purpose. Not only could they supply petrol and Diesel oil, but they were also about to make very great and most important developments in getting from coal for the first time other compounds of very considerable commercial value.

In all that work they were greatly stimulated by the presence of the Duke of Kent and of other distinguished visitors representing the Government and other bodies. That day would always remain one of the most pleasurable and interesting in the history of the Company.

The opening ceremony was largely attended by Government, technical, and foreign representatives, including members of the National Smoke Abatement Society, who afterwards inspected the plant.

A South Wales Plant.

Another important development is that announced by Mr. Ernest Brown, Minister of Labour, in the House of Commons on 9th March. Arrangements had been made, it was stated, between the Government, the trustees of the Nuffield Trust, and Low Temperature Carbonisation Ltd., for the erection of a large "Coalite" works in South Wales.

During the past few months, at the request of the Government, South Wales coals have been tested at the plant at Barugh, as a result of which coals which were perfectly suitable for the process have been found and the Government has been informed that no technical difficulties stood in the way of realising the Government's scheme for a coal-oil plant in South Wales.

A plant of similar capacity to that at Bolsover is being erected, and the fuel will be distributed mainly in the west and south-west of England.

HEALTH RESORT



AT BUXTON, as at all resorts similarly given over to the promotion of good health, purity of atmosphere amounts to stock-in-trade. In the choice of modernized gas works equipment a very big factor was the necessity for smoke-free operation. And, as at many other health centres, the chosen carbonizing plant was an installation of totally-enclosed **GLOVER-WEST VERTICAL RETORTS**

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IDLE THOUGHTS OF A TRAVELLER

It falls to the lot of a small proportion of the inhabitants of a country to travel at home and abroad in their ordinary course of "business life, and many hours are spent during which business affairs sink into the background and one's mind lazily reviews the conditions of life and country, noting the differences, good and bad compared with those of one's own district. To dwell any length of time in another country or district in one's own land is to stultify the powers of criticism, as first impressions soon fade and one becomes indifferent, as is the case of those living in an air polluted region.

On a recent visit to Ireland the first thing that caught the eye of the writer was the white sheep which confirmed the statement of the small boy of a friend of mine who asked his father whether they washed the sheep in this country. Whilst many scientists in the past and even in the present time, produce valuable data concerning the amount of air pollution, there is no better guide to air contamination than the fleece of sheep in any district. The lanoline in the fleece has the peculiar property of being an excellent smoke absorber. Between Manchester and Sheffield a distance of 50 miles, there are no sheep with clean fleeces, showing to what extent the air is polluted.

There is little doubt that those living in such districts have lost all power of criticism and take the condition as normal. This leads one's thoughts to who suffers most, man or woman, and to this my answer is: the housewife. Her days are spent in toil against the smoke evil, her husband being engaged in earning the means of living. He cares nothing for her daily labour.

Insulated from the Spring.

"There is hanging just now over the West Riding a kind of blackness which seems to be insulating this part of the world from the full horse-power of Spring. Others besides myself can hardly have failed to have noticed it, but I can claim to have made a particular study of it. I have studied it not only from underneath (in Leeds City Square), and sideways-on (from the heights of Cookridge), but this week I have also had a bird's-eye view of it from an aeroplane. It was an impressive sight. From a comparatively clear sky, one saw hanging over Leeds such a dense pillar-of-cloud-by-day that it almost looked as though another landmark had been erected for the Children of Israel.

"Industry can no longer be blamed for all the obscurity that hangs over big cities. By far the greater part of it comes from our household chimneys, and every new building estate means that there is to be more of it. Only when smokeless fuel is in every coal cellar can we hope to get on terms with the first blush of Spring."

From the *Yorkshire Post*.

The housewife does not know that much of the money he hands to her is wasted in useless washing and mending and too frequent renewal of all that is necessary for the family life. As a man one wonders what would happen were the position to be reversed, and the man stayed at home. I cannot think men would be content to spend their hours in useless drudgery, but would as a body accept smoke abatement as a leading object in their lives.

And so one drifts on to the conclusion that woman's mind is inferior to man's, although she claims an equality of thought. Accepting this fact of mental inferiority is it not necessary to arrange that the future generation of women are trained to think about a subject which so closely concerns them, thereby ensuring their co-operation? Children are easily taught to observe and deduce from observations; they produce partisans of any creed. It is held that school curricula are already too crowded, but what subject is of such civic importance as that of air pollution? A nation of women smoke abaters would be a great achievement, whereas much of what the girls now learn is soon forgotten, having no utilitarian purpose other than the examination room.

R.H.C.

(While hastening to inform women readers that we accept no responsibility for some of the opinions expressed above, we would add that steps are being taken to ensure a greater diffusion of smoke abatement knowledge in schools, especially in classes and training centres for hygiene and domestic economy. Readers are invited to send in their views on why the housewife accepts the smoke evil so placidly, and whether man, if he ran the home, would rebel.—Ed.)

New Sulphur Extraction Process.

The discovery of a cheap and economical way to extract pure sulphur from the harmful gases normally discharged into the air by smelter furnaces was the subject of a lecture on 22nd March by M. P. Appleby, research manager of the Billingham works of Imperial Chemical Industries, Ltd., to the Newcastle section of the Society of Chemical Industry.

The new process has been evolved out of research undertaken independently by I.C.I. in England and the Swedish firm of Bolidens Gruvaktiebolag. Not only will the use of the process materially reduce injurious pollution of the atmosphere but the sulphur recovered will be very considerable in amount. It is estimated that the annual loss of sulphur in smelter furnaces is two million tons—nearly the total production of the Texan and Silician mines.

In the first stage the process will give concentrated sulphur dioxide, which demands a ready sale in liquid form. The gas can be further treated to produce pure sulphur if desired. It is stated that the process will reduce the sulphur dioxide content of, for example, the flue gases of power stations, to a degree well below the limit at which they become a nuisance to nearby residents.

A.A.C

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NEWS AND VIEWS

The Control of Gas-Fired Plant.

The British Commercial Gas Association's Industrial Uses of Gas Series is now firmly established as a recognized source of reliable practical information on a wide range of subjects. The latest issue deals with the control of gas-fired plant. The essence of most improvements in manufacturing technique is the ability to control processes within finer limits. The main advantage of gas over other fuels is that it can be more accurately controlled. The practical details of the control of gas plant are therefore of great importance to all industrial users of gas as well as to all students of engineering and allied sciences.

The booklet contains illustrated descriptions of the various methods of temperature measurement, and of temperature control, based on them. It also deals with boiler controls, clock controls, gas governors and safety devices. Besides 18 drawings and photographs of instruments there are 25 photographs of representative gas installations from all over the country and from many different industries.

A bibliography and a list of manufacturers of measuring and control gear complete a most useful publication.

The booklet, which is No. 10 in the Industrial Uses of Gas Series, may be obtained, post free, on application to the publishers, Gas Industry House, 1 Grosvenor Place, London, S.W. 1.

A Smokeless Pottery.

Claimed to be the first entirely smokeless pottery in Stoke-on-Trent, a new factory erected for Messrs. Alcock, Lindley, and Bloore, Ltd., in Clough Street, Hanley, is in operation.

All the heating, for the factory and for the various processes, is either by gas or electricity, and a feature of the modern equipment is a large gas-fired tunnel oven. The factory will be devoted entirely to the manufacture of tea-pots.

This is, it would seem, the first step in the revolution mentioned by Sir Francis Joseph in opening a "Civic Centres" exhibition, organized by the Royal Institute of British Architects, at Hanley on 22nd February.

After making suggestions for a Stoke-on-Trent Civic Centre, Sir Francis concluded his address by saying :

"In the next fifty years there is to be a tremendous improvement in coal consumption. You are not going to have the soot and grime and dirt which you have to-day from the consumption of coal. In another thirty years there will hardly be a potter's oven which is not fired by gas or electricity—and I hope the brick works will be taken in long before that. You may pass them on the way to Talke, and it is a positive scandal. If I am connected with that industry, and I am wrong, let me know ; and, if expenditure of money will put it right in the interests of the city and true economy of natural resources, I will do it."

A Smokeless Estate.

Only industries using gas, smokeless fuel, or electricity will be allowed on a land reservation at Scacroft, Leeds. The corporation has zoned the district for light industries so that the amenities will be preserved and at the same time work provided for people living on the housing estate to be built there.

Smoke Over Renfrew.

Readers will recollect the tragic air accident in south Scotland, when the *Daily Express* aeroplane, engaged in surveying inland air routes, crashed in the hills and caused the deaths of all its occupants, including Harold Pemberton, the newspaper's special representative.

In the last, or one of the last, dispatches written by Mr. Pemberton, and published on 1st February, the following passage, of particular interest to ourselves, occurs :

"The weather to-day over the easier of the two routes was foul. The faithful 'Sparks' kept Captain Jackson pilot of Dragon Fly, closely posted regarding the murk ahead.

"The visibility around the airport nearly reached to condition known as Q.B.J., which means quite impossible.

"Ayr from the machine was a spectacle that would supply a fair argument for the Smoke Abatement Society. It was shrouded in blue smoke. Even more curious was the scene as we flew down the smoky valley to Renfrew. You would never see such a picture from a railway carriage.

"There was a complete blanket over the valley. Through it protruded like stage properties the tops of tall chimneys, church spires, and electric power pylons. Buildings themselves were invisible.

"Above the smoke screen 'Sparks' was busy obtaining bearings. His last bearing brought us over the centre of the airport, which was well out of the smoke screen."

It was from Renfrew the aeroplane set out later on its last voyage. We deeply regret the accident, but we are glad to be able to record Mr. Pemberton's all too short comment upon the increasingly important question of the danger to aircraft through reduced visibility caused by smoke palls.

Sunshine in Lancashire.

The recently published records of sunshine and temperature show that the industrial area of south Lancashire maintains its reputation for being the dullest area in the British Isles. The average duration of sunshine in Oldham Road, Manchester, for the whole

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“COALITE” is made from the best of best coal after it has been washed to remove the ash and other impurities. There is only one standard of quality—the BEST.

“COALITE” burns with plenty of flame, gives out great heat, but does not smoke or form soot.

“COALITE” makes chimney cleaning unnecessary and decorations and curtains keep clean for a much longer time.

“COALITE” is half the weight of coal, thereby providing the users with twice as many scuttles to the ton. It is also easier to carry and cleaner to handle.

“COALITE” is suitable for all types of grate, stove or range. No other form of fuel need be stocked.

“COALITE” is easily lit in the usual way with paper and wood. It makes a magnificent fire at low cost, giving out the most beneficial form of radiant heat.

“COALITE” is a national asset. In the manufacture of “Coalite,” Petrol is produced for the Royal Air Force, Fuel Oil for the Royal Navy, Diesel Oil and other valuable products. Also, by the use of “Coalite,” smoke and fog producing elements are eliminated with a beneficial effect upon the health of the people.

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of December is but seven hours. At Whitworth Park it is as much as thirteen hours—a difference which indicates the direct influence of the smoke pall. We have to go to the Shetlands to find comparable figures for a non-industrial area.

Smoke Menace to Bath Abbey.

In "Abbey Notes" the Ven. S. A. Boyd (Archdeacon of Bath) comments upon the remarks relating to the smoke menace to his church, which were made by Dr. Des Voeux at the summer meeting in Bath of the Association of Technical Institutions.

The Archdeacon observes: Attention has been drawn lately to the injury done to stonework by air heavily charged with smoke. Ocular demonstration is supplied and has for years been supplied by the Abbey, the blackness of many parts of the Building being due to nothing else. In many respects the Abbey is most happily situated, but it is not happy in having in close proximity many chimneys daily discharging sometimes heavy black smoke. Not all, apparently, know that the black deposit is not harmless, but hurts and disintegrates the surface of the stone.

Drastic Attack Needed.

Whether further minute investigation will do much to advance the cause of smoke abatement is doubtful. We may know all about the incidence and distribution of smoke, the chemical composition of deposits, and so on, but what is needed is a drastic attack on smoke emission at the source. Otherwise our skies will remain only half permeable by sunlight and our clean new houses and public buildings will be steadily blackened, as has usually happened in the past. The most generally satisfactory remedy will be found in the still greater use of gas and electricity and in the development of smokeless solid fuels to be burned in ordinary grates like coal. There does not seem much doubt that the overwhelmingly large mass of pollution arises from the millions of domestic chimneys in their total pollutive effect; but it is just the problem of the domestic chimney which remains so difficult to solve on a large scale.—*Nottingham Guardian*.

A Letter from Huddersfield.

In these days there are many letters to the Press complaining of smoke nuisances and of smoke in general. The one quoted below, though, is particularly appealing. both in substance and in the way it unconsciously reveals the feeling of heart-breaking despair at the unceasing drudgery that is the lot of the housewife in our industrial towns. It was addressed to the Editor of the *Huddersfield Daily Examiner*, from which paper it is quoted:

"I wonder when the people of our town will awaken and realise what filth they breathe in. What about the old saying, "As white as the driven snow?"

"Yes, it is certainly white when it falls, but after lying in our gardens only one day what does it look like? I'm not mentioning what it looks like when scraped to the sides of our roads. Still, that is what we have to contend with. Who is doing anything in the matter? Why should our town be always black, except when a kind wind comes in a certain direction and clears the air.

"Talk about a "smoke barrage," why we have it all the time, and people say the sun is wanted for health. Then why blot it out with smoke? Surely something can be done, and women need not work themselves to death by trying to 'clean down' daily. What are our influential women doing in this matter? Surely, they could not work for a more important thing than a cleaner town? If anyone has time to watch any of our mill chimneys for half an hour, he or she will soon realise the stuff that is poured out. Besides, from what I hear from some who understand, this fearful smoke really means waste of money. We are asked now to paint the outside of our houses to make them bright and gay for the coronation. Well, well, just look in town, and see the shops which have tried to make things cleaner. no; it is a heart-breaking business.

"Yours, etc., A TIRED WOMAN."

Ideal Domestic Gas Boilers.

Ideal Domestic Gas Boilers have been specially designed to give a plentiful supply of hot water with the minimum of attention. They are finished in a fine, durable vitreous enamel, the jacket being grey mottle and the base and top-plate black. The gas cocks and thermostat are chromium plated. It will be seen that apart from its neat appearance, the boiler is very compact and occupies little floor space. Automatic controls are provided to regulate the amount of gas burned according to the demand for hot water. As soon as the required temperature has been obtained, the controls automatically shut down the gas to a self-pilot flame, and the small pilot flame remains until the water is drawn off from the system or the temperature of the water falls, when the flames are returned to the "full on" condition by the action of the thermostat.

A Gas Governor controls and ensures gas being supplied to the boiler at the correct pressure for efficient operation.

A draught diverter of approved type is supplied with the boiler eliminating danger and maintaining efficiency and economy in running cost. The insulating jacket reduces loss of heat from the boiler, and prevents overheating the room in which it is fixed.

Ample clean-out openings are provided for the removal of lime deposit from the boiler, the wide water-ways tending to lengthen the period between cleaning.

For soft water districts the boiler can be supplied rustless.



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SMOKE ABATEMENT

By J. T. DUNN, D.Sc., F.I.C.

A Paper read to the North of England Institute of Mining and Mechanical Engineers.

Whether we want power or light, or heat, we come back, sooner or later, in this country, to the combustion of coal. We know that the combustible portions of coal consist of carbon and hydrogen in various states of combination, and that when coal is completely burnt these are converted into carbon dioxide and water vapour, which we might put into the atmosphere in very considerable quantities without causing inconvenience, or doing any harm to anyone. But we also know, first, that a great deal of the coal we use is not completely burnt, and that the effect of its partial combustion is to send into the atmosphere what we commonly call smoke ; second, that coal contains, beside carbon and hydrogen, sulphur, and that that sulphur when burnt produces acid gases that can be very destructive ; and third, that coal also contains mineral matter, which when the coal is completely burnt is left as ash, and that in certain circumstances this ash, alone or with some of the unburnt carbon of the coal, is sent into the atmosphere as dust or grit.

Taking in the first place Smoke, we may inquire, what is its nature or its composition, in what quantities is it sent out into the atmosphere, in what ways is it harmful or objectionable, and how is that harm to be reduced in amount or prevented altogether.

The smoke from any chimney consists of the residual nitrogen from the air which has been used in burning the fuel, together with the excess air carried along by the chimney draught, and the "soot," or products of the destructive distillation of the coal which have escaped combustion. Cohen and Ruston, in Leeds, who were pioneers in this work, made a number of analyses of soot, from domestic and factory chimneys (including both boiler installations and metallurgical works). Their figures showed—

	Domestic		Industrial
	%		%
Carbon ..	36 to 52	..	16.7 to 47.7
Hydrogen	2.2 to 4.8	..	0.9 to 2.7
Tar ..	10.2 to 40.4	..	0.1 to 10.6
Ash ..	4.9 to 27.3	..	31.5 to 82.0

In the domestic chimneys, kitchen chimneys showed less tar than living-room chimneys, and the upper parts of the chimneys showed higher proportion of tar than those lower down. In boiler chimneys the tar rarely rose

above 1 per cent. The high figure of 10.6 was from a metallurgical works. Domestic soot, then is much more tarry and sticky than industrial soot, which partakes more of the nature of "Grit."

Carbon Losses.

Many attempts have been made to measure the amount of carbon lost in the soot emitted, as compared with the coal burnt. Roberts Austen in 1884 after lengthy experiments on domestic grates arrived at the figure of 6 per cent. Cohen and Ruston examined various coals in the same grate, and got figures varying from 4.8 to 10.2 and averaging 6.5 per cent. Other observers have obtained very similar figures. Experiments on boiler plants show a very different result. Scheurer Kestner found that the loss here never reaches 1 per cent, and is usually between 0.5 and 0.75 per cent. Taking these figures, and assuming the domestic consumption of coal to be 40 million, and the factory consumption 80 million tons per annum, there is a loss from this source of from

Domestic Chimneys ..	2,400,000
Factory Chimneys ..	400,000

	2,800,000

tons per annum. The domestic loss is really greater than this, for the destructive distillation of coal in the grate produces not only the liquid and solid products which form soot, but also combustible gases which escape up the chimney unburnt.

This soot is evidently very widely distributed, for only a very small part of it falls in the immediate neighbourhood of its production. Of the "soot gauges" established under the auspices of the Advisory Committee on Atmospheric Pollution of the D.S.I.R., and which are gradually furnishing data of the comparative smokiness of different towns and of different localities in the same town, Newcastle possesses three—in the Westgate Cemetery, at the Newcastle and Gateshead Water Co's. reservoir at Byker, and on the Town Moor. The tarry matters in the sootfall collected in these gauges, calculated over the whole area of the city, would represent, taking the 1932 figures, an amount of 70 tons in the year. But if we assume as a rough guess, that the domestic consumption of coal in the city is 250,000 tons per annum, the soot from that would weigh 15,000 tons, and the tar in that soot (at say 20%) would weigh 3,000 tons, a quantity of which 70 tons would only be 2.3 per cent. We have other evidence to show that, whilst at any

Radial Smoke Burners

APART FROM THE NUISANCE, THE ELIMINATION OF BLACK SMOKE IS ESSENTIAL IF YOU ARE TO OBTAIN THE UTMOST EFFICIENCY FROM YOUR BOILER AND THE FUEL USED

The following extract taken from the "Steam Engineer" January, 1937 issue, will confirm this statement

" —Soot, which is a better non-conductor than asbestos can be kept down to a minimum by efficient combustion. The loss of heat due to soot deposits is one of the important items in the bill of costs which can be brought against black smoke."

BY FITTING THE RADIAL SMOKE BURNER YOU WILL :

- 1. ELIMINATE SMOKE NUISANCES**
- 2. AUGMENT THE RADIANT HEAT**
- 3. BURN LESS EXPENSIVE FUELS.**
- 4. EXTEND THE CLEANING-OUT PERIODS**
- 5. OBTAIN A HIGHER RATE OF COMBUSTION**
- 6. INCREASE THE BOILER EFFICIENCY**

When the Burner is in operation a roar can be heard at the back of the furnace thereby proving that the particles of soot which form black smoke are being effectively consumed.

The load on the boiler is negligible, as dry steam which expands to many times its volume in hydrogen form, is used.

We have installations in daily use which are showing a return of capital outlay every three months.

It can be fixed to natural draught and any forced-draught furnace with complete success.

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moment the greater part of the soot produced hangs in the atmosphere over the place of its production, it is ultimately very widely distributed, and produces its deleterious effects, to some extent, over a very wide area.

The Effects.

What are these effects? We may divide them into those produced whilst the soot is suspended in the air, and those produced when it sinks and is deposited.

Its effects whilst suspended arise from the fact that it deprives us of sunlight. It absorbs the rays of light, and more especially those "ultra-violet" rays in the sunbeam which lie beyond the limits of the visible spectrum, but which have important effects on both vegetable and animal life.

Some of the records at Cockle Park give us an idea of the amount of sunshine that we lose through smoke. Sunshine records have for some years been taken at Cockle Park and at Armstrong College. The records for 1927 show that during the summer months Armstrong College received only one half, and during the whole year only two thirds of the sunshine that Cockle Park received, only 16 miles away, whilst the records of the previous year, during which the coal strike occurred, show that the loss at Newcastle, as compared with Cockle Park, instead of being 50% in May, gradually falling to 33% in August, was in May only 28%, and fell gradually to 11%.

This lack of sunlight produces its effect both upon vegetable and upon animal life. It has long been known that sunlight assists, if it does not cause, the assimilation of carbon dioxide by the leaves of the plant, and thus its growth; and the diminution of the intensity of sunlight by a curtain of smoke thus enfeebles the plant, both by the direct loss of ultra-violet rays, and also through the lower temperature reached by the leaves. But additional damage is done to plants by the actual deposition of soot upon their leaves. We are all familiar with the black coating on the leaves of town-grown plants, which not only further absorbs the lessened sunlight falling on the plant, but blocks the stomata and does not allow the plant to breathe. Cohen and Ruston grew seedlings of various kinds in various parts of Leeds and the adjoining country, and found in all of them that the size and vigour of the resulting plants diminished as the locality in which they were grown had a more polluted atmosphere. They gave quantitative expression to what we all observe qualitatively. Mr. Besant, the Director of Parks in Glasgow, at a conference there in 1934, said "In our large cities trees, shrubs, and other plants can only withstand the atmosphere for a limited time, and periodically have to be replaced by sturdy country-grown specimens," and our own Parks Superintendent, Mr. Dick, said to me "My experience is very much as Mr. Besant has pointed out. Evergreens like Cupressus and Yews only exist a few years in the parks near the

centre of the City, and roses are very much affected. Soft-leaved plants like *Agrostemma*, *Myosotis* and the finer varieties of *Verbascum* simply disappear during the winter and spring months."

Further, it has been shown that plants grown in smoke-laden areas fail to absorb from the soil their normal amount of calcium salts, and that this deficiency is found also in the milk of cows pastured in such localities.

Sunlight.

We are all familiar now with the fact that deficiency of sunlight is the cause of rickets and similar diseases, and our "sunray clinics" are our clumsy and costly attempt to counteract the evil which we have caused by obstructing the natural source of these rays; but other serious effects on health are due either to the same cause or to the existence of the fogs which occur in nearly all large cities. No doubt other causes than smoke contribute to infant mortality; but it is still significant that whilst the rate in the suburbs of Manchester was 55, it was 109 in central Manchester; and whilst it averaged 56 in the rural districts of the country, it was 74 in the county boroughs. And during the prolonged fogs in London in 1934, the deaths from respiratory diseases, which were 49 per 1,000 on November 3rd, when the fog began, rose during the next four weeks to 71, 81, 115 and 121.

Not less important, though its extent cannot be measured in figures, is the psychological effect of a polluted atmosphere. We all know the depressing effect of a dull day, and the exhilaration produced by bright sunlight and clear skies; and we can readily imagine that if in Newcastle we had always the clear atmosphere that we had during the coal strike, and if we could always behold our street architecture in the natural colour of its original stone, Newcastle would be still less of a "depressed area" than it actually is. This aspect of the smoke problem must count for a good deal.

Not only living beings, but inanimate objects, too, suffer from the effects of smoke. The stone of our buildings is not only blackened and disfigured, but corroded and eaten away by the soot and its associated acid from smoke. Here it is the acid that does the damage; but were there complete combustion and no soot, there would be in the first place less deposition, less formation of fog or mist particles, and the acid would be carried away and dispersed over a far wider area than now, and in the second place, when it did fall it would be much less adherent than when associated with the tarry soot, be more easily washed away by rain, and have less opportunity of doing damage. Sir Frank Baines, the former head of the Office of Works, in a paper read in 1933, gives details of damage caused by smoke to many of our national and historic buildings, the Houses of Parliament in especial, and shows how enormous must be the aggregate over the whole country.

Visibility.

Another prejudicial effect of smoke, which has only of recent years arisen, but which will increase in importance is the diminution of visibility caused by it, which causes difficulties to aviators. A conference held last year in London, on Smoke and aviation, showed that the effect of city smoke in lessening visibility is not confined to the immediate vicinity of the city, though of course most intense there, and that though the abolition of smoke would not prevent altogether the formation of fog and mist, yet the difficulties of aviators from this cause are very greatly increased by the smoke which is produced to-day.

People do not always consider the cost of the polluted atmosphere to the community, and it would be very difficult to estimate its total, for many of its effects are indirect, but a few isolated figures can be given, which show that that total must be enormous. In the paper that I have just quoted, Sir Frank Baines gave it as his opinion that "The cost due to making good the results of atmospheric impurity to our buildings for the whole of the country can be placed at a minimum figure of 55 to 60 millions sterling during the last quarter of a century; the actual damage if carefully calculated from all sources, would probably be found to be far in excess of this." And in 1924 speaking of the cost of keeping in order the public buildings by cleaning, painting, etc., he said "If the air were as clear and pure in towns as it is in the rural districts, I estimate that at the very least £120,000 per annum could be saved upon the maintenance of official buildings in the charge of my Department." If we consider what proportion the government buildings bear to the whole of the buildings in the towns and cities of the kingdom, we can perhaps form a faint idea of the extra cost of keeping them decent, arising from smoke.

The Manchester Inquiry.

Not only buildings, but clothing and furnishings suffer from smoke. The Manchester Corporation instituted a statistical inquiry, comparing a hundred working class houses in Manchester with the same number of similar houses in Harrogate, as to the time taken and the materials needed for the weekly washing. The results showed that on the average the time taken in Manchester was one hour more than that in Harrogate, and that the extra cost of materials and fuel in Manchester over that in Harrogate was 7½d. per week. Calculated out to the total number of such houses in Manchester, the total extra time involved in the course of a year amounted to nearly 6,000,000 hours or 668 years, and the total extra cost to £183,000 per annum. Making a rough estimate for the larger houses in Manchester

the extra washing bill for the city amounted to practically a quarter of a million per annum.

After these statements smaller things seem hardly worth while, but it may be of interest to know that in Manchester, for example, a day's fog costs the inhabitants £950 more for gas and £1250 more for electric light, than a day of ordinary daylight—£2200 in all. Or that the bill for washing the outsides of houses in Kew Gardens after a fog amounts to £100.

All these things show, that, from the point of view of pecuniary loss alone, it would be well worth the while of the community to spend considerable sums, if by doing so they could secure the abolition of smoke.

It is very usual and convenient to divide the sources of atmospheric pollution by smoke into industrial and domestic, and we may include with industrial smoke that produced by the central heating of large buildings in cities, such as hospitals, groups of offices and so on.

The proportions in which each of these sources contribute to the total must of course vary greatly in different localities. Very few attempts have been made to estimate them with any accuracy, but a few years ago the Medical Officer of Health for Salford made a careful investigation, and found that the weekly consumption of coal in the Salford factories was about 6,000 tons, and in domestic fires about 11,000 tons. Assuming these figures and remembering that according to our most trustworthy data about 6% of domestic coal, and only about 0.5% of factory coal goes into the air as smoke, it is obvious that in Salford the domestic source is much more important than the industrial. Probably the situation here in Newcastle is not very different, and in all cities the domestic source must at least produce a very considerable part of the total pollution.

Admitting as we must admit, the extent of the evil, we may reasonably inquire what steps have been taken, or could be taken to cope with it, and whether it is on the whole increasing or diminishing.

Legislation.

We have legislation which attempts to lessen or regulate the emission of industrial smoke. The Public Health Act of 1875 dealt with "black smoke," but its provisions were for many years practically a dead letter. In 1926 the Public Health (Smoke Abatement) Act was passed, which imposed penalties for the emission of smoke of any kind, if in such quantities as to be a nuisance, and under this act a local authority may make bye-laws regulating the emission of smoke, as to colour, density, content or duration and frequency of continuous emission. None of this legislation, however, applies to the smoke from dwelling-houses.

(To be continued).

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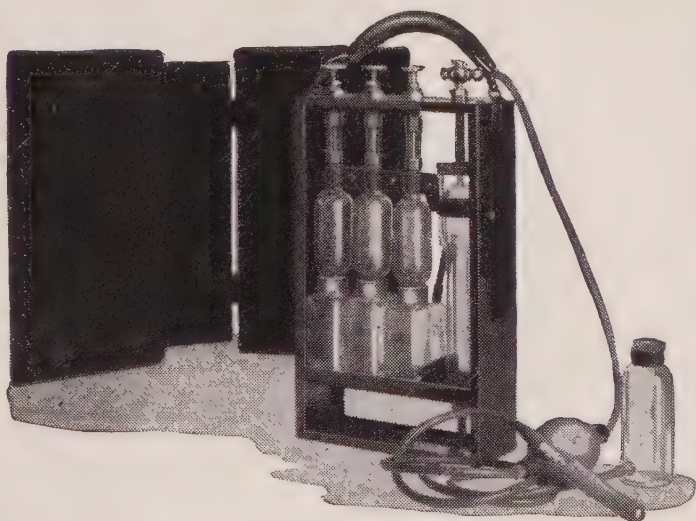
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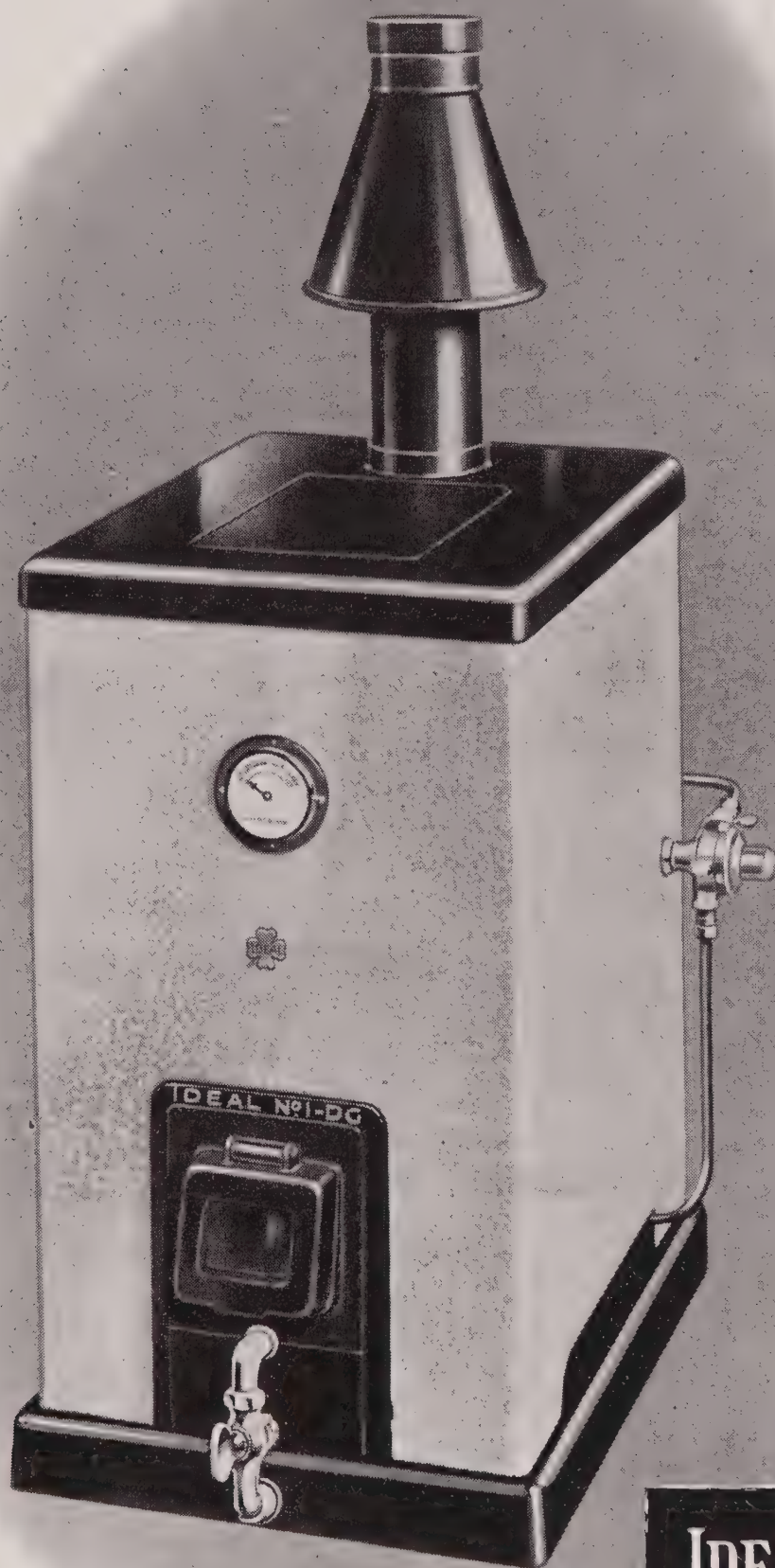
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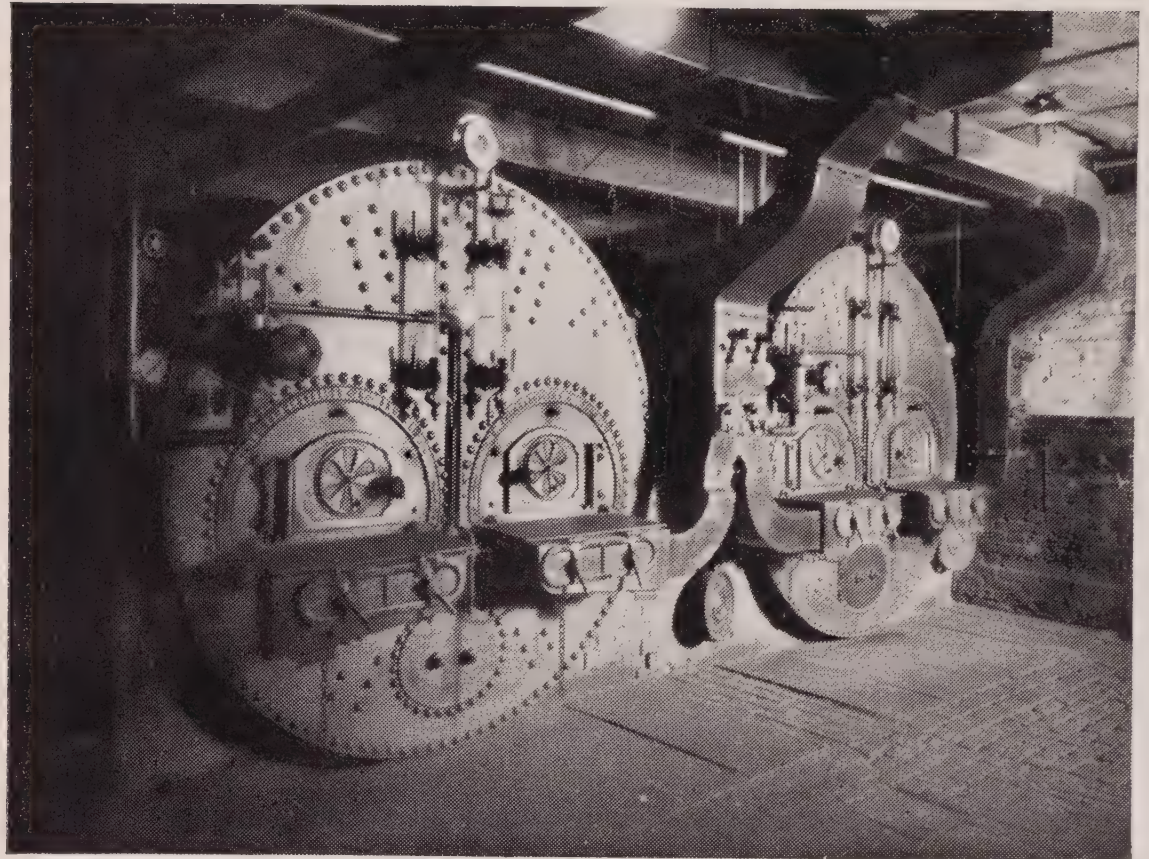
THE JOURNAL OF THE NATIONAL SMOKE ABATEMENT SOCIETY

VOL. VIII.
NO. 31.

AUGUST
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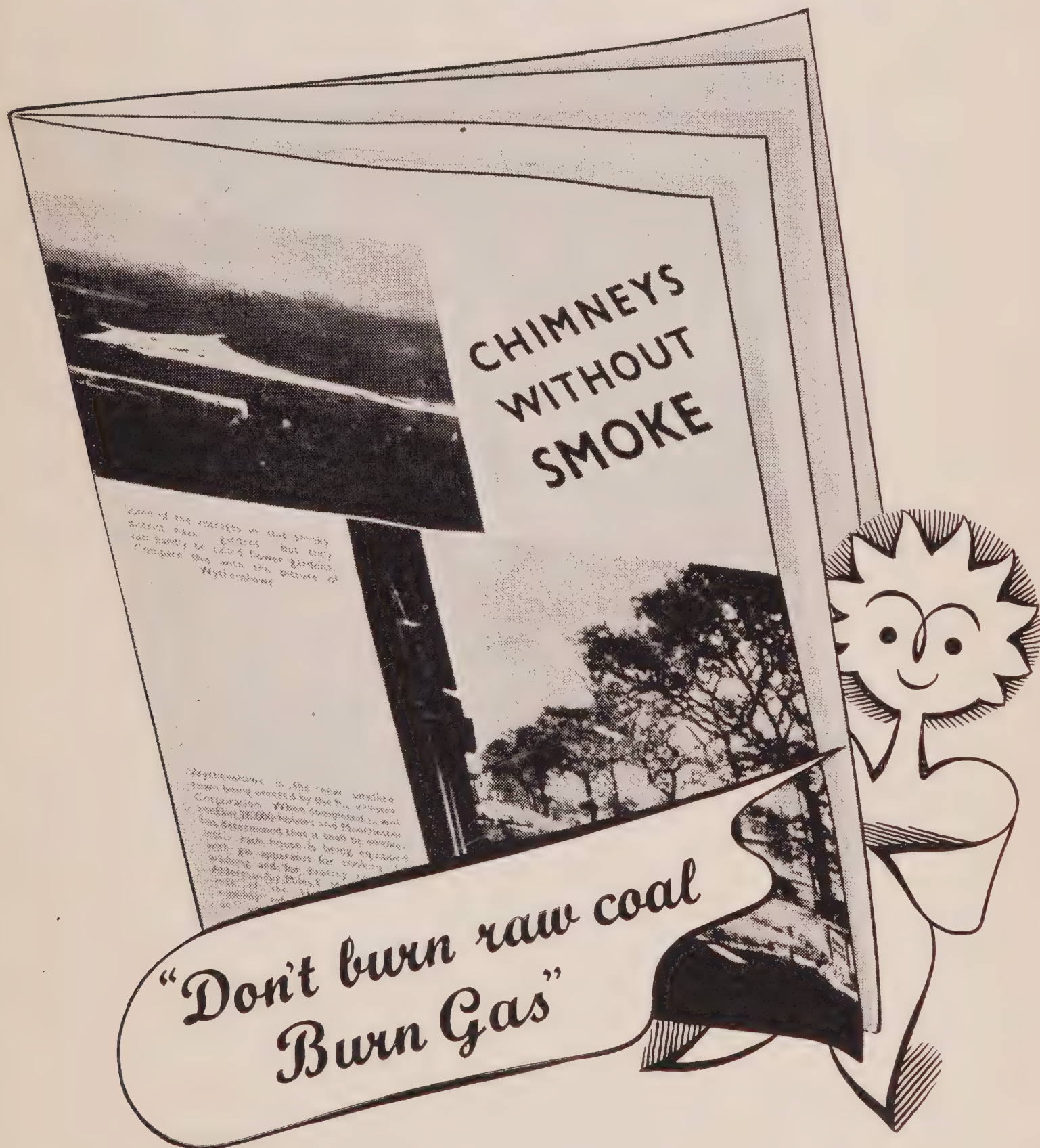
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The Journal is open for free discussion of all aspects of the smoke problem, and the opinions expressed in contributed articles are not necessarily the same as the views of the Society. Quotations and abstraction of matter appearing in the Journal is welcomed, provided the usual acknowledgements are made.

COMMENTARY

THE Society has now occupied its new offices in London. The address is Chandos House, Buckingham Gate ; and it is a curious coincidence that it was in Buckingham Gate, at the house of Dr. Des Voeux, that the first meetings of the Coal Smoke Abatement Society were held. That was nearly forty years ago, and considerable progress has been made since then. Not only has there been an effective improvement in the state of the atmosphere—see the D.S.I.R. report reviewed on a later page—but there has been a complete change of the public attitude towards smoke. Not a little of that change has been due to the years of persistent effort that began in such a modest way in Buckingham Gate. Let us hope that the work that is now beginning in the same street will prove to be equally fruitful.

Removing, and the packing of stationery and publications, was sufficient demonstration, although in this case hardly needed, of the expense and nuisance of smoke deposit to office premises and property. Parcels and boxes that had been stored away for some time has an astonishingly heavy layer of dirt (dust is too mild a word for it). Anything that had not been carefully wrapped or encased was spoiled, while under similar conditions in a clean atmosphere there would have been but a slight and easily removed dustiness. Either money has to be wasted in the spoiling of property or has to be expended in thorough and frequent cleaning or in the provision of dust-proof cases or packings. But even cabinets and bookcases which look efficient enough, are not always invulnerable to the persistent attack of smoke-

dirt. And, apart from the cost and waste involved, there is the sheer unpleasantness of having always to contend with it. The complacency of the commercial world towards such conditions is amazing and makes one wonder where "business efficiency" really begins.

We are grateful to the *Daily Telegraph* for the excellent smoke abatement supplement that was issued on 5th July. The supplement consisted of twenty-four articles and illustrations dealing with the more important aspects of the problem and the questions of sunlight and health, combustion and fuels, and so on. The first article was by Sir Lawrence Chubb. Altogether it was a most valuable and stimulating publication, and we congratulate the *Telegraph* on a most successful enterprise.

The British Pavilion at the Paris Exhibition has aroused some criticism and some letters to *The Times*. We should like to add to this by drawing attention to the mural painting on the front wall of the pavilion. This, with highly exaggerated truthfulness, depicts what is presumably meant to be a typical British landscape. It shows some factory chimneys, the smoke from which forms a regular inversion layer over the whole picture. To visitors of other nations this must convey the idea not only that Britain is a most disagreeable place in which to live, but that it is lamentably backward in scientific vision and technical achievement. To the delegates attending the conference of the International Union of Local Authorities the symbol of British industry must seem oddly at variance with the consciousness of pollution problems revealed to the conference from this country.

This conference, with world-wide municipal representation, has been discussing two subjects, namely milk and atmospheric pollution. In the latter section an elaborate questionnaire was

circulated to each country, and in our own case was answered by Dr. Johnstone Jervis, who represented the British Committee of the International Union, and the N.S.A.S., at the conference. The printed reports of each country, prefaced by a general report by M. Humery, the *rapporteur* to the section, are a source of much valuable information. The general report, giving the principal conclusions derived from the national reports, will be reprinted in the next issue.

The Leeds Conference, which begins on 30th September, looks like being one of the most successful yet held. The number of delegates so far appointed exceeds the number for any previous conference, except that at the Science Museum last year. This is perhaps not surprising for most of them are representatives of local authorities, and Leeds is the centre of one of the largest and smokiest manufacturing areas of the country. Continuous attention has been drawn to the problem for many years by the West Riding Committee—the first formed of the Regional Committees. Three subjects only are to be dealt with, as it is hoped that there will be more value obtained from a full discussion of fewer subjects than by crowding in too many. The first session, on the Friday morning, will deal with "Town Planning and Smoke Abatement," the second with the work and future of the Regional Committees—this should lead to a good discussion—and on the Saturday morning will be discussed proposals for bringing smoke abatement before educational authorities with a view to giving schoolchildren the outlook that is required if the next generation is to make an end of the smoke evil. The chairman at the meetings will be Alderman Sir George Martin, of the Leeds City Council, and Professors Cobb and Whytlaw-Gray of the University of Leeds. The Conference will open on the Thursday with a reception by the Lord Mayor in the new Civic Hall, and will end in an equally enjoyable way with a motor tour to Fountains and Bolton Abbeys on Saturday afternoon.

THE INVESTIGATION OF ATMOSPHERIC POLLUTION

REPORT FOR THE YEAR ENDED MARCH, 1936

In the 22nd Report on the Investigation of Atmospheric Pollution, which has recently been published (H.M. Stationery Office, 6/- net) it is stated that the Standing Conference now consists of representatives of 47 co-operating bodies. 36 other bodies, mostly local authorities, also support the investigation, the contributions to which amounted to £759 during the year. The operations during the year were 110 deposit gauges, 11 automatic filters, 11 sets of apparatus for determining volumetrically sulphur gases in the air, and 39 sets of apparatus for estimating the "activity" of sulphur in the air by means of the lead peroxide method.

The most important development which the Research Committee have on this occasion to report is the definite decision to undertake the intensive survey of the pollution in and around a specially selected area and the choice of the City of Leicester for this purpose. It was hoped that by the time the report was published the survey would have been started and regular observations begun. As nearly as can be reasonably hoped the City of Leicester fulfils the requirement of an industrial centre relatively isolated from the main industrial areas, and it has the very important added advantage that the City Authorities have for many years taken a keen interest in the investigation of atmospheric pollution.

It was reported last year, that, in anticipation of this survey, a full-time investigator had been appointed who would ultimately be placed in charge of it and who, in the meantime, would gather experience of the instruments to be used and general knowledge of problems involved in the measurement of atmospheric pollution. The appointment of this investigator has had another important advantage in making possible experimental work on several outstanding problems which would otherwise have had to remain in abeyance. Chief among these are: (a) the measurement of daylight, (b) the measurement of sulphur in relation to the wind direction, (c) the measurement of the conductivity of rain water, and (d) the determination of the relationship between the optical density and the mass of dust stains.

The measurement of daylight has received much attention, and in new directions. Several types of instruments have been examined and a new form of daylight photometer which seems likely to present advantages over any of those at present available is being developed.

A Definite Reduction of Pollution.

The publication of a large mass of figures, continues the report of the Research Committee, such as is con-

tained in the Annual Report, serves little useful purpose unless, at the end of a number of years, some definite conclusions can be drawn from them regarding the changes which are taking place in the purity of the air of the towns throughout the country. The position in recent years must have been markedly affected by the great industrial depression of 1930-33, and account must be taken of this in any attempt to discover whether propaganda and legislation designed to reduce atmospheric pollution have been effective. With returning industrial activity, the amount of fuel burnt has been increased, so that if the standard of efficiency remained constant an increase in pollution is to be expected. A small improvement in methods of combustion of coal may well be masked by an increase in the amount consumed. Unfortunately, it is not possible to get very precise figures for the amounts of coal consumed in different ways, e.g., in industry and in domestic houses.

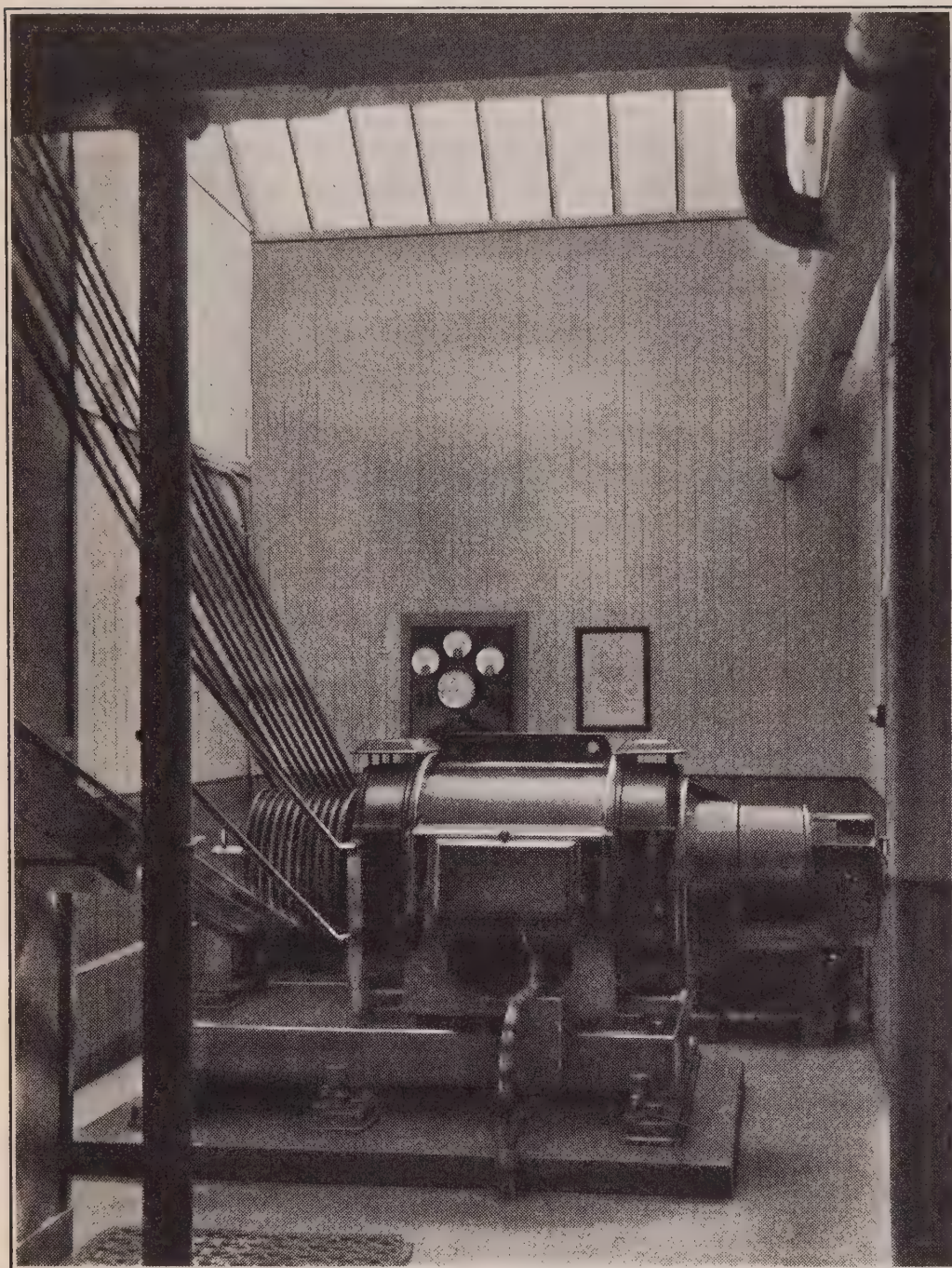
The results now available—at some stations going back to 1915—indicate definite ground for belief that the smoke abatement movement has had a real effect. The total deposits and also the amount of sulphates in the deposits for those stations with long records are plotted in the report. In certain cases there is a small increase in the pollution during the last two years—a fact easily accounted for by the increased industrial activity—but the outstanding feature of the curves is the large decrease in pollution occurring at many stations before the depression started.

Turning from the deposited impurity to the suspended matter in the air, it is found that while some of the stations shown in the curves given in the report indicate an improvement in the state of the air, two of them at least indicate a very marked increase in pollution.

The ratio of the amount of sunshine received at Kew Observatory and in central London has been used by Shaw and Owens as a rough measure of the amount of pollution in London. In the Report of the Superintendent of Observations their figures have been brought up to date. The result shows that in London the percentage of winter sunshine compared with that at Kew has risen from 20 to 52 since 1881, a very marked improvement.

"It may be concluded," ends this section of the report, "that on the whole there has been a definite reduction in the extent of pollution in Britain during the past twenty years."

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The Year's Records.

Table I appended shows the general trend of pollution by comparing the figures for 1934-5 and 1935-6 with the general average of the station concerned. It will be seen that the latter figures are not so favourable as those of the previous year, so far, that is, as the number of stations showing an increase or decrease is concerned. The highest deposit of total solids is again recorded at Netherfield Road, Liverpool, with a monthly mean of 58 English tons per square mile. Mearns Kirk Hospital,

Glasgow, a new station, has the lowest figure: 7.88 tons. The most marked increase of one station is at Finsbury Park, where the total solids were 158 per cent. higher than the general average. Sulphates at this station showed an increase over the general average of no less than 341 per cent. Another feature is the increase by 237 per cent. of the ash deposit at West Heath, Birmingham. The most marked reduction is for Cooper Bridge, Huddersfield, the fall being to 33 per cent. of the general average.

Table I.


	Per cent. of Stations showing a <i>Reduction</i> of 10% or more below the G.A.		Per cent. of Stations showing an <i>Increase</i> of 10% or more over the G.A.		Per cent. of Stations <i>no change</i> , i.e. between 90% and 110% of the G.A.	
	1934-5	1935-6	1934-5	1935-6	1934-5	1935-6
Insoluble matter—						
Tar	39	41	25	38	36	22
Carbonaceous, other than						
Tar	32	27	33	50	35	23
Ash	40	21	28	42	32	37
Soluble matter—						
Loss on Ignition ..	56	39	21	29	23	33
Ash	63	39	16	33	21	29
Total Solids	44	25	17	31	39	44
Included in soluble matter—						
Sulphates	57	43	16	29	27	29
Chlorine	50	22	20	55	30	23
Ammonia	71	59	18	25	11	16

The following is the list of stations, with the deposit for the year expressed in English tons per square mile. The bold figure in the second column is the percentage of the deposit for the year compared with that station's "general average," where this is available.

Table II.

Ashington, Hirst Park	214	—
Birmingham, Gt. Charles St. ..	446	—
West Heath	181	138
Bournville, Village	159	144
Works	175	129
Bradford, Central	362	97
North	167	127
Bristol, Water Works	312	—
Zoological Gardens	168	—
Burnley, Bank Hill Hospital ..	285	—
Parker Lane	464	—
Cardiff	177	100
Castleford	295	84

Dewsbury, Manorcroft	206	96
Ravensthorpe	322	154
Whitley	146	130
Edinburgh, Bruntsfield House ..	172	—
Leith Links	163	—
St. Andrew's Square	237	—
Garston	146	99
Glasgow, Alexandra Park	308	111
Bellahouston Park	187	77
Belvedere Hospital	301	—
Botanic Gardens	224	74
Glasgow Cross	304	—
Mearns Kirk Hospital	92	—
Queens Park	194	95
Richmond Park	296	100
Ruchill Hospital	251	—
Ruchill Park	216	89
Tollcross Park	275	93
Victoria Park	214	68



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Gloucester	154	87	Salford, Drinkwater Park	180	95
Halifax, Akroyd Park	182	130	Ladywell Sanatorium	276	96
Belle Vue Park	185	129	Peel Park	291	77
Infirmery	170	137	Sheffield, Attercliffe	329	110
Wade Street	329	123	Hillsborough	211	—
West View Park	182	154	Nether Green	129	120
Huddersfield, Cooper Bridge	114	33	Stocksbridge	208	—
Deighton	255	65	Surrey Street	304	79
Kingston-upon-Hull, Central	264	77	Shipley	242	—
Leeds, Headingley	155	121	Southampton	193	—
Hunslet	234	101	Southport, Bedford Road Park	142	117
Park Square	359	109	Hesketh Park	116	91
Templenewsam	127	131	Stoke-on-Trent, Leek Road	220	102
York Road	302	97	Longton	289	101
Leicester, Humberstone	159	—	Tunstall	261	—
Jarvis Street	308	—	Wakefield, Clarence Park	133	96
Town Hall	327	96	W.R. Rivers Board	257	93
Liverpool, Aigburth Vale	154	—	Wallsend, The Rectory	176	94
Cambridge Street	306	100	Walsall	121	—
Netherfield Road	683	122	Wolverhampton	155	—
St. George's Hall	321	—	An interesting and useful feature of the report is the tables and graphs showing the trend of deposit at various stations over a series of years. Some stations now have records extending back to 1922, or before, and the annual figures for total solids, sulphates, and tar are given separately. From these tables it is a simple matter to note where, and to what extent, any continued improvement has been made. Glasgow, for instance, shows a steady improvement since 1915, while London shows progress up to 1922, followed by fluctuating records with little or no further improvement.		
London, Archbishop's Park	426	143			
Battersea Park	268	—	Printed as an appendix to the report is an article by J. R. Ashworth, D.Sc., F.R.Met.S., on ultra-violet and visible rays in Rochdale. Records obtained from the northern and southern halves of the sky show that an important amount of ultra-violet radiation is received from the sky itself, apart from the sun. It is deduced that about four times as much radiation is received from the sky and clouds as from the sun.		
Finsbury Park	397	158			
Golden Lane	286	70	The notes discuss the variations on the days of the week and the monthly and seasonal variations, both in Rochdale and in suburban stations to the south of Manchester. The figures obtained show clearly the adverse effects of atmospheric pollution in obstructing solar radiation.		
Horseferry Road	337	96			
Kew, "N"	122	103			
Kew, "S"	129	99			
Mount Street	308	109			
Ravenscourt Park	287	87			
S. Kensington (M.O.)	223	91			
Southwark Park	253	90			
Victoria Park	219	105			
Wandsworth Common	179	97			
Westminster (K. Charles St.)	356	130			
Loughborough	204	71			
Marple	103	63			
Newcastle, Town Moor	249	103			
Welbeck Reservoir	225	—			
Westgate Cemetery	325	86			
Rochdale, Town Hall	233	86			
Rothamsted	106	94			
Rotherham, Oakwood Hall Sanatorium	171	117			
Technical College	308	—			
St. Helens	447	99			

British Coal Distillation.

British Coal Distillation has completed arrangements with the B. A. Collieries for the erection and equipment of a distillation plant, the latter under the Suncole process, capable of distilling 450 tons of coal per day. 93,000 tons of Suncole fuel will be produced per annum for domestic and power purposes, in addition to motor fuel and spirit.

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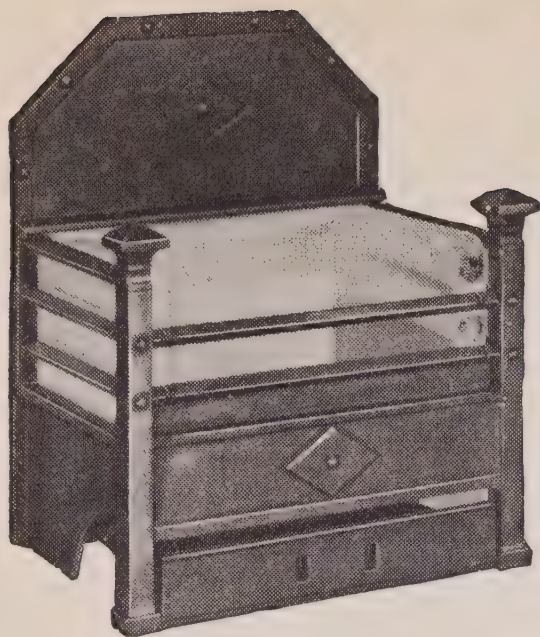
Impurity in the atmosphere is most undesirable ; but the effect on the human organism is not so serious as might have been expected. Buildings, curiously enough,

suffer from smoke fumes more than women and men.

—*Daily Mail*.

A Tribute.

There is a public awakening to the need for smoke abatement, but, as we have emphasised before, much more general effort should be put forward to eliminate the nuisance, and the Smoke Abatement Society is deserving of greater support. The Society is untiring in its efforts and has been responsible for considerable improvement and many useful suggestions as to the lines along which further improvements might well be made.—*Gas Journal*, 26th May, 1937.



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SCOTTISH BRANCH CONFERENCE

MEETING AT GREENOCK

The Annual Conference of the Scottish Branch of the Society was held this year in the City Chambers, Greenock, on 21st May, when the Annual Report of the Branch was submitted and papers on various aspects of the smoke problem were delivered.

The first paper was by Professor John R. Currie, M.A., M.D., D.Ph., Professor of Public Health in the University of Glasgow, on the subject of "Fog."

He pointed out that although cloud and fog are due to the same cause, cooling, they differ greatly in the extent to which they affect the comfort of man. Clouds form in the air high above our heads, but fog, which is due to the earth cooling the air in contact with it until condensation occurs, is earth-bound and does not tend to rise and its upper surface reflects back the rays of the sun. Winter fogs, moreover, are aggravated in this country by the presence of smoke and other combustion products.

The effects of smoke in the area of its production are to diminish sunlight and in particular to curtail the ultra-violet radiations; the carbon in the air chokes plants and the sulphuric anhydride by reacting with the matrix of sandstone, splinters off the surface of the stone and so defaces buildings.

The effect on human health of the combination of smoke and fog is however the gravest of the charges laid against smoke. A notorious London smoke fog lasted with some intermission from November 1879 to February of the following year. During one month of the fog the deaths in the City week by week were 1730, 1900, 2200 and 3376, the numbers increasing steadily as the fog continued. Bronchitis, pneumonia and asthma were noted as the chief causes of death. The bronchitis death rate rose to 331 per cent. above the average, and the death rate from whooping cough, which was prevalent at the time, to 231 per cent. above the average. In more recent times a dense five-day fog in November, 1909, fills a dark page in the history of the City of Glasgow. In the week before the fog, the deaths from bronchial diseases were 75, in the week of the fog 138 and in the week after 233, the higher rate in the last week representing the duration of the fatal illnesses with which the patients were seized during the week of the fog. In November 1936, during the fogs in the north midlands of England a similar log was shewn by the joint respiratory deaths of Leeds, Liverpool, Manchester and Salford.

Fog is a natural phenomenon and we cannot prevent it from starting but we can mitigate the severity of a smoke fog by eliminating the sulphur-producing material which we burn, e.g. by fitting mechanical stokers to boiler furnaces, by installing air smoke control plant, by the use of anthracite or coke in lieu of coal, by the smokeless combustion of oil, by the substitution of electrical

power or gas and by increasing the height of chimneys, and in the domestic sphere by the use of gas fires and gas cookers, electric fires and electric cookers and also to some extent of smokeless fuel.

The next step forward should be to establish control of the sulphur components of industrial smoke and this may be a matter of urgency before very long.

Domestic Pollution.

This address was followed by one from Mr. Birkett Wylam, M.Sc., Ph.D., A.I.C., of the Department of Health for Scotland, on the subject of "Domestic Pollution." He stated that the most difficult aspect of the problem of smoke abatement was certainly that of the pollution from domestic sources.

Out of 160 million tons of coal used in Britain for all purposes each year, about 40 million tons are used for domestic consumption. There is no doubt that this causes more pollution spread over the whole country than 120 million tons used industrially. The domestic fire, particularly the open grate, is a most inefficient appliance for coal burning and causes a good deal of distillation of the volatile constituents of the coal, producing smoke and soot. Yet one open grate is a necessity in a dwelling-house; it can act as a most efficient ventilating apparatus and as a domestic incinerator. The speaker believed that the use of gas for heating purposes could be extended by the gas undertakers themselves by means of the two-part tariff system of charging with a lower commodity rate so that the consumer can obtain the benefits of increased use of gas after paying his quota of distribution charges, standard charges, etc.

Electricity is excellent and cheap for lighting and power, but it is often an expensive form of heating.

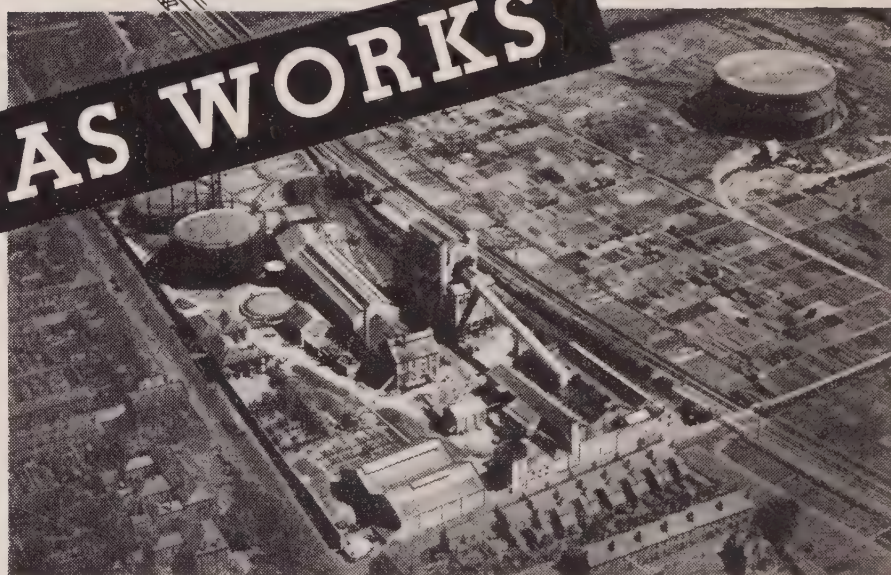
High temperature coke, anthracite, etc. are fuels which can be used with advantage in closed stoves and independent boilers, but low temperature coke (smokeless fuel, semi-coke) was to his mind the ideal domestic fuel; it is smokeless, easy to ignite, easy to manipulate and clean in use.

The speaker then went on to describe several kinds of low temperature fuel, in the provision of which not only a good type of smokeless fuel is obtained but also gas and oils. Bituminous coal is the most popular domestic fuel, but unfortunately it is this fuel which causes such widespread smoke pollution. However, the excellent research carried out by the Coal Utilisation Council in collaboration with the Combustion Appliance Makers' Association and with the Fuel Research Board seemed to give some hope that it will be possible to burn bituminous coal smokelessly for domestic purposes.

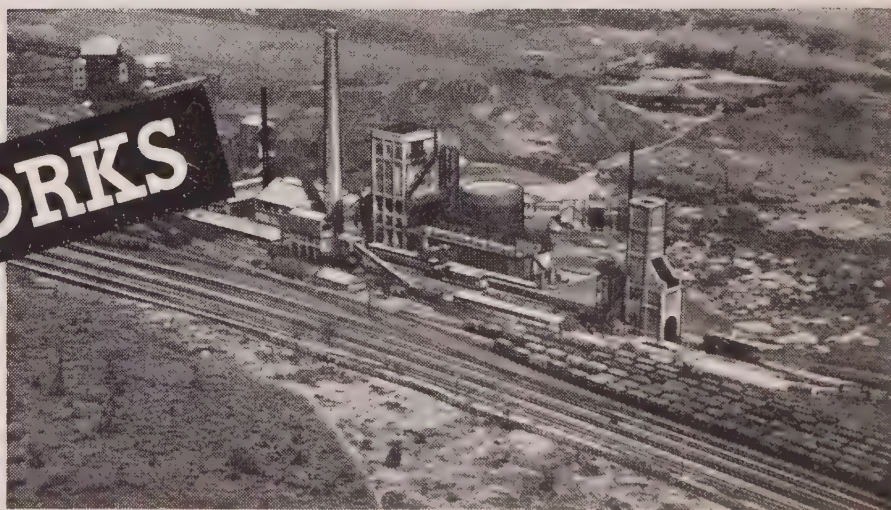
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A great opportunity lay in the hands of local authorities. These bodies are in the position to influence materially the public opinion of their constituencies. An endeavour should be made to provide the tenants in housing schemes with appliances to enable them to obtain the maximum use of such fuels as coke and gas.

The manufacture of low temperature fuel in gas works is a principle which could be usefully extended and he looked for the day when all our coal will be carbonised the gaseous and solid products used for heating and for power raising, and the tars and oils providing new materials for a chemical industry and ever increasing prosperity.

Coal Utilization.

This address was followed by one by Mr. J. Edward, Combustion Engineer of the Coal Utilization Council, on the subject "Coal Utilization and Smoke Abatement." In Mr. Edward's absence, the paper was read by Mr. Gardner, who stated that the coal industry was in complete sympathy with the aims of the Smoke Abatement Society. It realized that smoke is a bad advertisement. Atmospheric pollution over our big cities is usually attributed to the domestic coal fire or to industrial plants using solid fuel, but careful observation will disclose that other fuels are not entirely guiltless. Oil is a good example of a fuel that, burned under wrong conditions, can give most unpleasant and injurious smoke and fumes. Gas and electricity do not produce smoke at their point of consumption, but gas works and electricity generating stations often are serious offenders. It is not so much to the nature of the fuel itself that we should look for the cause of smoke troubles as to the way in which the fuel is used.

Many people, well-intentioned but badly informed, suggest that we should stop burning coal or at least cease to do so in its raw state, but the economic disadvantages are too great for any well-informed person to consider this as being within the realm of practical possibilities under existing conditions.

It would appear that the object of Smoke Abatement should be to continue and if possible accelerate progress by improved combustion appliances and technique so as to bring about a state of affairs in which any fuel can be burned without the production of smoke. That, and

not the substitution of one fuel for another is both the true ideal and the most reasonable line of advance.

It is generally agreed that the domestic hearth is the chief offender so far as the pollution of the atmosphere by coal smoke is concerned. A great part of the smoke from a domestic fire is given off during the ignition period and realising the difficulty encountered by the average user in meeting these conditions the Coal Utilization Council set aside a considerable sum of money for research work which has already borne fruit in the introduction of a self-lighting smoke reducing fire.

The self-lighting principle consists of a gas jet on top of the fire so constructed as to diffuse a turbulent flame over the coal. This flame operates the dual purpose of igniting the coal and of consuming the volatile—smoke—which must pass through the burning gas.

Another development which may help to reduce the amount of smoke over our cities is "District Heating" which is being extensively used on the Continent and in the United States of America. This aims at providing heat and hot water "on tap" from a central boilerhouse where experienced men and modern appliances would eliminate all smoke. Further, many industrial establishments which have a "process steam" load can, by the use of a combined "power process" load, obtain the electric power requirements for as low as one tenth of a penny per unit, the reason being that in the ordinary steam generating station where no service can be found for the exhaust steam, 60% of the heat in the fuel is lost in the circulating water for the condensers.

It can be stated that central heating with solid fuel only requires modern equipment and use to be entirely smokeless; also that smoke from the industrial furnace is largely preventable either by raising the skill of the stoker in hand fired installations or by the use of mechanical stokers.

Smoke is a nuisance and also waste. There would be a marked improvement in the conditions of our skies if fuel users, both industrial and domestic, would make greater use of the knowledge and technical assistance already available. In fact, if preventable smoke from both industrial and domestic appliances burning bituminous coal were to be eliminated the smoke problem of our great cities would very largely disappear.

On Monday, 28th June, Mr. David Adams asked the First Commissioner of Works what diminution, if any, in the use of raw coal has been made in Government offices in Whitehall during the previous 12 months and when it is expected that the complete elimination of atmospheric pollution from this source will be achieved?

Sir P. Sassoon: Raw bituminous coal represents 20 per cent of the total amount of fuel consumed by Government offices in Whitehall, and there has been no material diminution in the use of this coal during the last 12 months. The extension of central heating is tending to eliminate atmospheric pollution by gradually reducing the number of open fireplaces, and smokeless fuel is used in these fireplaces whenever local circumstances make it possible without an undue increase in

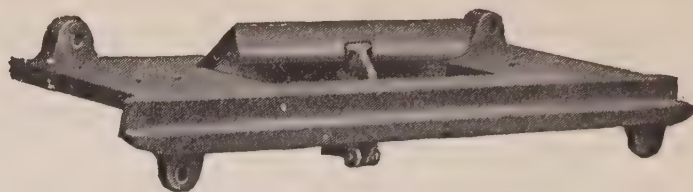
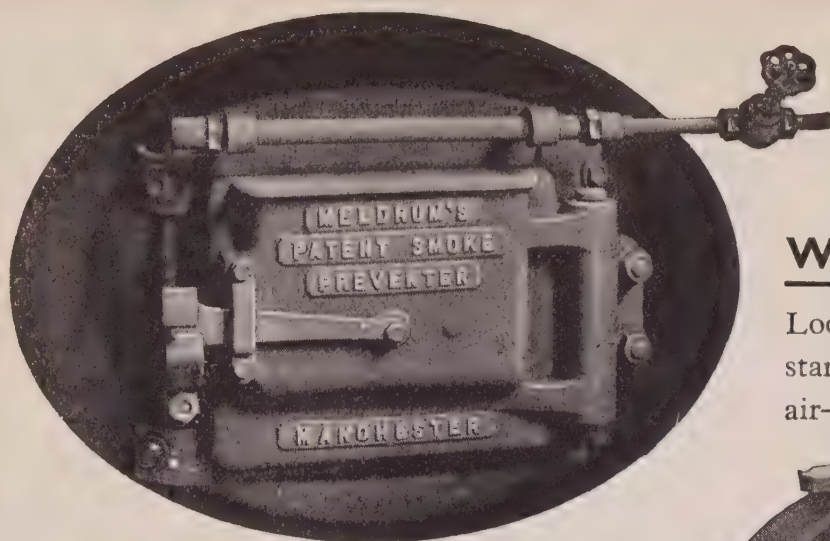
cost, but I regret that I am unable to forecast the date at which the elimination of atmospheric pollution from the use of raw bituminous coal will be achieved.

Mr. Adams: Does not the Minister see the absurdity of his Department being employed in cleansing the fabric of the Parliament building and of Westminster Abbey, while at the same time this smoke nuisance continues from offices which come under his department?

Sir P. Sassoon: Smokeless fuel is used wherever the local circumstances permit, as long as it does not involve an unreasonable increase of cost.

Mr. Thorne: Would there be any difficulty in installing gas fires for use during the winter?

Sir P. Sassoon: I should like notice of that question



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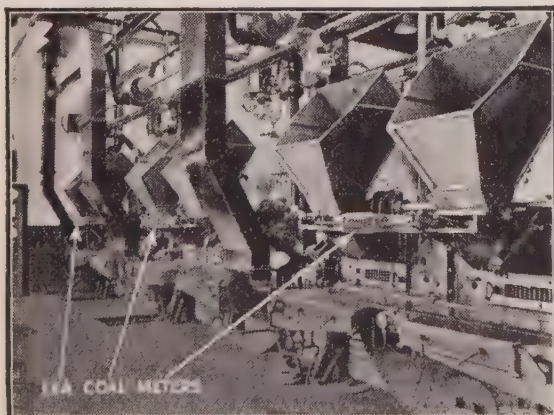
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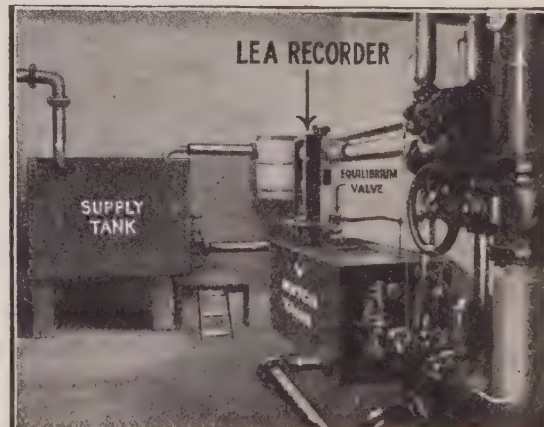
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THE REPORT ON ALKALI, ETC. WORKS

IMPORTANT DEVELOPMENTS RELATING TO SMOKE

The recently published 73rd Annual Report on Alkali, etc. Works, by the Chief Inspector (H.M. Stationery Office, 1/- net) is of considerable interest to those concerned with smoke abatement. The Alkali Inspectors are now directly in touch with smoke abatement matters, and it has been arranged that they should advise the Minister on developments. The Inspectors in the first place interviewed the Hon. Secretaries of the several Regional Committees and officials of some local authorities, and reported on their methods and activities.

"The constituent members of these Committees," states the report, "centre round the large industrial cities and the inquiries which were made indicated that, although the cities themselves are active in smoke abatement work, they receive in general, but little support from the outlying areas. Thus, much of the good work performed in the cities is lost by reason of pollution having its source outside. Smoke cannot adequately be dealt with parochially and it seems that the greatest prospect of success would be ensured if the problem were attacked by Regional Committees to which all the local authorities over a large area had delegated their powers in the matter of smoke abatement. At present, in one instance only (Sheffield, Rotherham and District), does a Committee exercise full executive powers on behalf of its members.

"On the occasion of the Annual Staff Meeting of the Alkali Inspectors in October, it was decided to reserve one day for the discussion of smoke topics. It was also decided to invite the Regional Committees to be represented at the Meeting in order that they might express their views and exchange information. All the Committees, except Doncaster and District and Northumberland and Durham, availed themselves of the invitation. The opportunity of discussing mutual difficulties was appreciated by the representatives and a satisfactory and instructive meeting resulted. It is hoped to hold a similar meeting again next year. Some of the matters discussed and the conclusions reached are very briefly mentioned below.

"The desirability of employing well-qualified smoke inspectors was unanimously agreed. It was considered however, that Regional Committees could not employ inspectors unless this function was specially delegated to them by their constituent members. On the advantages and disadvantages of delegation of smoke abatement functions by local authorities to a Regional Committee, there was a divergence of views. The Sheffield Committee (as is pointed out above) has already had such functions delegated to it. The Manchester Committee is strongly in favour of joint action and is seeking to secure it by the instrument of a Joint Board. Other Committees were not in favour, preferring that each

constituent authority should be responsible for administration of the smoke laws within its own area although, presumably guided by the advice of the Regional Committee. It was pointed out that a large city in the region represented by a Committee enjoying full executive power would frequently have to contribute the major portion of the Committee's expenditure, while, to same extent, its policy would be guided by the views of the other constituent members. This objection might be met by making the representation of an authority on a Committee roughly proportional to its monetary contribution. In any case it seems reasonable to look to the County Boroughs to give a lead, on purely altruistic grounds, in their respective districts and to be willing to encourage combination and co-operation with neighbouring authorities.

By-Laws.

"By-Laws relating to black smoke are generally regarded as a useful means for strengthening the powers of a local authority, but that view is not unanimous. In the Sheffield Committee's Region there are no by-laws. The Committee has, however, agreed with the manufacturers certain standards in relation to steam boiler chimneys.

"There was general agreement that there would be little advantage in a by-law affecting smoke other than black smoke and based on any particular colour or shade, but the view was expressed by some of the representatives that a by-law for excessive or "opaque" smoke, if such a by-law were admissible, would be very useful. It was pointed out that even if a by-law for smoke other than black could be made and confirmed, it would be qualified by the fact that it would not be sufficient for a successful prosecution to prove contravention of the by-law, seeing that a best practicable means defence would still be available. On the other hand, in the case of a by-law for black smoke, it is generally sufficient for a successful prosecution to prove that the by-law has been contravened.

"It was made clear that the nuisance of grit emission is serious and widespread. The chief difficulty in controlling this nuisance lies in making a reliable determination of the solid content of effluent gases. There was, however, difference of opinion as to whether a by-law—even if suitable means of measurement could be devised—would prove an effective step towards abatement.

"There can be little doubt that in recent years there has been some abatement of domestic smoke owing to the increasing use of gas, electricity, and solid smokeless fuels. As was remarked in the last Report, their use should be encouraged. The time will probably come when the burning of raw coal will not only be regarded

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as an offence against public amenities, but will be prohibited on economic grounds, but that cannot be until a much greater and cheaper supply of smokeless fuel or energy is available. In this connection, interest has been taken in low temperature carbonisation processes and developments have been noted.

"As regards industrial smoke, there has been deplorably little progress except in those districts where gas and electricity are available at a price which permits of their economic use in industry. The principle of gas grids might be considerably extended. Although there have been great developments in recent years in the use of coke oven gas (about 25,000 million cubic feet being sold annually), there remains an enormous field for further development, particularly in connection with the steel trade, the tinplate industry and the potteries. There are still occasions when coke oven gas (of perfectly good quality) is burned to waste at a flare. There are also areas where there would be abundant surplus gas if old coke ovens were replaced by modern installations and suitable arrangements made with local gas undertakings. A manufacturer cannot be expected willingly to abandon cheap form of fuel unless he has an equally cheap alternative at his disposal. At the same time, it is not clear that the advantages of gas and electricity from the point of view of control, cleanliness and saving of labour, are always fully appreciated.

An 1897 Report.

"It is significant and somewhat depressing to note that Dr. Littlejohn, Medical Officer of Health for Sheffield, reporting in 1897, indicated as the main causes of excessive smoke production exactly the same factors as are found to-day. These factors are insufficient boiler capacity, carelessness in stoking and bad draught regulation. Dr. Littlejohn also advocated the use of gas in the Sheffield steel trade in place of coal and remarked on the fog-producing character of suspended dust particles in the atmosphere. Thus, the chief causes of industrial smoke production with which we are still endeavouring to cope were clearly recognised 40 years ago. Nor will they be eliminated until steam raising is more generally regarded as a scientific process. Not only should good, well-designed plant of proper capacity be provided, but it should be equipped with instruments to enable a strict control to be exercised over its operation. Moreover, stoking should be recognized as a skilled job and rewarded accordingly. The stoker is handling money—in the shape of fuel—and on his skill depends whether or not the money is wasted. Largely at the instance of the Regional Smoke Committees, classes for stokers are now available in many of the larger towns and certificates of proficiency are awarded when an appropriate examination has been passed. It is desirable on every ground, and not least on that of the manufacturer's own interest, that stokers should be encouraged to obtain their certificates. It would not be unreasonable to establish the position that a certificated stoker, having special knowledge, which is of value

both financially and otherwise to his employer, should receive extra pay.

"The Public Health (Smoke Abatement) Act, 1926*, provides, in effect, that a prosecution for the emission of smoke, other than black smoke, shall not succeed when adequate and proper plant for preventing the creation and emission of smoke is provided and efficiently maintained and also is used in a proper and skillful manner. Efficient stoking goes to the root of the second limb of this provision.

"There is no denying that great efforts have been made—and, in this respect the Regional Committees have been in the forefront—but it seems that the evil of smoke and grit emission has only been held in check. Far greater efforts must be made if it is to be eliminated. The number of Regional Committees should be increased to cover all the industrial districts. Each one should be responsible for the administration of the smoke laws within its own region—in an executive sense and not merely as an advisory body. The work of a smoke inspector involves high qualifications and is not easily fitted in with other work if full efficiency is to be secured. It is only through regional combination that the smaller local authorities can obtain the services of full time officers with the necessary experience. Regional Committees should also keep in close touch with each other and with the Central Authority. Full co-operation with industry is a further essential, for it is by the willing co-operation of industrialists and not by penal measures that success will eventually be attained. It has already been amply demonstrated that, when inspection is carried out in the right spirit and by competent men, the goodwill and sympathetic help of the manufacturers can be secured.

Smoke from Colliery Spoilbanks.

"During the year under review special attention has continued to be given to the question of burning colliery spoilbanks and the escape of green gas from coke ovens. Inquiries have also been instituted relating to smoke emission in the Potteries district and the escape of dust-laden waste gases from blast furnaces and, at the request of local authorities, various complaints alleging undue smoke emission have been investigated. Some of these matters are very briefly reviewed below.

"A number of burning tips have been under observation. In nearly every case the causes of fire could be attributed partly to an indiscriminate dumping of refuse; inferior coal, waste pit props and other combustible materials being all tipped together. Such feeding of a burning spoilbank naturally aggravates the situation and increases the volume of smoke and fumes, which are certainly objectionable even if they do not constitute a danger to health. Much of this material could, by means of modern plant, be crushed and cleaned economically or even used directly as fuel, thus bringing some financial return to the colliery.

*To be reproduced as from 1st October, 1937, in sections 101-106 of the Public Health Act, 1936.



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"Blanketing with inert material still appears to be the best method of abating fire and in several cases improvement has been effected by this means. In other cases, it has been thought better to cease tipping and allow the fire to burn out, starting a new tip on quite cold ground. In making such a tip the objects should be (a) to reduce the combustible matter to a minimum and (b) as far as possible to prevent the ingress of air to the interior of the tip. Rough stone should be dumped separately. This material is not itself very liable to spontaneous combustion but if it is mixed with other rubbish it tends to keep the heap porous. Wet washery dirt and similar fine materials will pack into a solid mass which being almost impermeable to air, is not likely to fire. Two such spoilbanks which were started eight months ago have been carefully watched and, up to now, have shown no sign of heating. In other cases, resort must be had either to layering with inert material (such as sand or clay) or to grouting in the manner described in the 72nd Report*. There is really no insuperable difficulty in the case of flat topped heaps so long as discrimination and common sense are used. "Picking" should be rigidly prohibited. Not only do the pickers disturb the surface and make holes through which air may enter but the practice is undoubtedly fraught with no inconsiderable danger to the pickers themselves.

"At the spoilbanks which have been investigated, substantial improvement has been effected in the majority of cases. There have, however, been a few failures.

* NOTE:—It is understood that some success also has followed the application of powdered limestone (in the form of a slurry) to the interior of a burning spoilbank.

Conical or rigid spoilheaps, produced by tipping from an aerial ropeway or creeping conveyor, provide the most difficult cases. The larger stones and lumps roll down the heap and accumulate at the bottom, thus constantly disturbing the surface and keeping the base of the heap in an open condition. At one such tip, a more complete separation of combustible matter was instituted and the waste was treated with sludge from a water softening plant before it was dumped. For a time this seemed to be quite effective. It was, in fact, thought that the tip would become quite inert and inoffensive. Recently, however, fire has again broken out all round the base and conditions are now as bad as ever. The heat is such that the shale is distilling, thus providing gas and oil which ignite and generate more heat. The only hope in a case of this sort seems to lie in the abandonment of the existing tip and the commencement of a new one, taking precautions from the outset by blanketing or grouting, to exclude air.

"When the Colliery Companies have been approached on the matter of spoilbanks, they have usually agreed quite readily to carry out the suggestions made. There are exceptions to the above generalisation, but there are also some collieries where active and successful attempts have voluntarily been made to abate spoilbank fire and to prevent firing of new tips. Complaint is sometimes made about the extra expense involved. Such complaint cannot be justified. Other commercial undertakings have to dispose of their trade wastes in such a way as not to cause nuisance and there is no reason why collieries should not do likewise to the best of their ability."

REGIONAL COMMITTEE NEWS

West Lancashire and Cheshire.

The annual conference of the West Lancashire and Cheshire Regional Smoke Abatement Committee was held in the Municipal Annexe, Liverpool, on June 23rd.

The Hon. Secretary (Dr. W. M. Frazer, M.O.H. Liverpool) in his report upon the work of the Committee during the previous twelve months stated that a number of invitations to join this Committee had been extended to local authorities who, although within the area of the Committee, were not members. It was with regret that the Committee learned that none of the authorities so invited could see their way to participate by joining.

The publication of the handbook "Smoke Abatement and Fuel Economy in Industry" under the auspices of the Committee has met with considerable success—400 copies having been sold. It is interesting to note that copies of this book have been applied for from places as far apart as Belfast, Portsmouth, Dumfries and Grantham. Copies are still available from the Hon. Secretary, Public Health Department, Municipal Annexe, Dale St., Liverpool, 2, at sixpence per copy.

Smoke abatement and fuel economy classes held during the winter months of 1936/7 were attended by 55 students. An examination was held at the conclusion of the session and certificates of proficiency were issued to successful candidates.

In order to promote closer co-operation between the Committee and the Ministry of Health a resolution was passed inviting Mr. H. G. Howson, who is the local Inspector of Alkali, etc. Works to become an honorary member of the Committee.

At the conclusion of the business a visit was made, through the courtesy of Mr. P. J. Robinson, City Electrical Engineer of Liverpool, to the Clarence Dock Power Station.

Sheffield, Rotherham and District.

There is nothing abnormal to report with regard to the work being carried out in the area since the previous issue. Both steelworks and collieries are very busy and are working on maximum output. Reconstruction and extension work at the larger factories is going on as

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quickly as possible. A number of small works which have only been working intermittently or have been shut down have recommenced working steadily and unfortunately the old obsolete types of furnaces which cause pollution have been put into operation. Colliery chimneys which have been keeping within the prescribed standard have increased their loads owing to the installation of mechanical working in certain cases and are causing nuisance. This is being dealt with by installing extra boilers or increasing the evaporation of existing boilers by mechanical draught, but the latter method must be considered as a "palliative" rather than a "cure" for the nuisance.

The difficulty of smoke nuisance from heat treatment furnaces which work at a low temperature is being considered by a number of manufacturers and the reconstruction work varies considerably according to the process. Electrical heat treatment, town's gas, producer gas and pulverized fuel types are being operated. With regard to the pulverized fuel method it is noted that no method of grit arrestment is in operation and though no serious nuisance has been observed it is a matter that will need close observation and consideration.

Owing to the increased industrial activity it has been found somewhat difficult for the staff to keep a systematic observation of the total number of chimneys in the area. In order to overcome this difficulty it is proposed to reduce the observation time from one hour to that of thirty minutes. This will bring the method of smoke observation of thirty minutes duration in line with that of other industrial centres, in closer conformity with the "time standard" put forward by the Ministry of Health, and will enable the staff to carry out more observations. The committee decided that for a trial period of three months the following standard be adopted and that the matter should again be reviewed at the expiration of such period.

Where there are 1 or 2 boilers attached to a chimney,
2 minutes per half hour.

Where there are 3 boilers attached to a chimney,
3 minutes per half hour.

Where there are 4 or more boilers attached to a chimney,
4 minutes per half hour.

Where there are 1 or more boilers and 1 or more furnaces
attached to a chimney, 4 minutes per half hour.

Radiovisor Patent Ltd.

At the Annual General Meeting of this company held on 23rd June, 1937, the Chairman (Lieutenant-Colonel the Hon. A. C. Murray) referred to their work on the automatic control of smoke. The damage to health and property caused by the smoke which overhung our great cities like a coffin pall needed no emphasising. Smoke control was necessary to Power and Works Engineers from the aspects both of purifying the output

Manchester and District.

At a meeting held on 16th June, Alderman W. T. Jackson, J.P., was re-elected Chairman. The Report of the Hon. Secretary (Dr. R. Veitch Clark) for the year 1935 was approved. The Report stated that with respect to the proposed Joint Statutory Board for the area a series of visits to individual local authorities had been made by the Chairman and Hon. Secretary. Promises of support had been received from a considerable number of authorities when the proposed Board reaches concrete form. In the meantime further visits were being arranged.

A resolution was approved declaring that the time had arrived when serious consideration should be given to the desirability of the qualified exemptions enjoyed by certain industries under the Public Health (Smoke Abatement) Act, 1926, being withdrawn, and was forwarded to the Ministry of Health.

47 students had enrolled for the elementary classes in boiler firemen, and 80 for the advanced courses, held at the College of Technology, Manchester. A course of lectures was also held at Warrington.

West Riding of Yorkshire.

The Annual Conference of the West Riding of Yorkshire Regional Smoke Abatement Committee was held on 1st July. The number of constituent authorities had been considerably reduced owing to the amalgamation of 27 urban districts and two rural districts to form six new urban districts.

A report on presence of metallic substances in atmospheric dust, as determined by an examination of metallic plates, had been received, as a result of which the Committee were of the opinion that the quantities of injurious metals present in the atmosphere were so small as to be negligible from the point of view of their effect on human health. It was decided, therefore, not to pursue the investigation further.

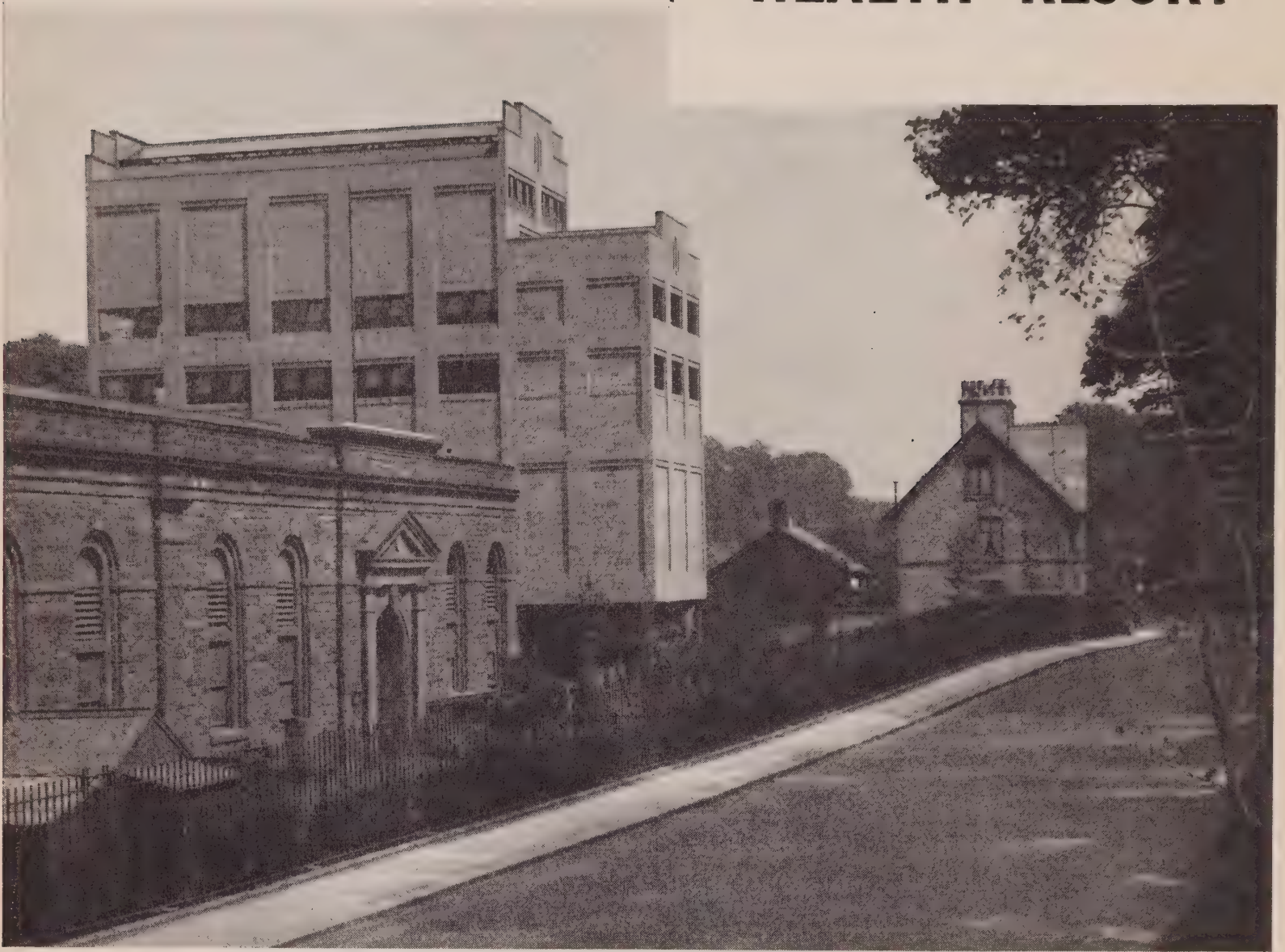
The problem of burning pitheaps and spoilbanks is dealt with in the report at some length.

During the year classes in boilerhouse practice were held at four colleges and the total number of students attending was 70. Of these only 29 entered for the examination of the Regional Committee, the remainder either dropping out or having already obtained the certificate and were attending classes for a second year to prepare themselves for the City and Guilds of London Institute examination.

from the chimneys and of obtaining efficient combustion. The Radiovisor Smoke Indicator was an up-to-date and highly satisfactory method of achieving these purposes, and the fact that it had been installed by most of the important Power Stations in England spoke for itself.

It was also significant, continued the Chairman, that Radiovisor smoke density indicator, recording and alarm devices had been installed in important industrial plants during the past year.

HEALTH RESORT



AT BUXTON, as at all resorts similarly given over to the promotion of good health, purity of atmosphere amounts to stock-in-trade. In the choice of modernized gas works equipment a very big factor was the necessity for smoke-free operation. And, as at many other health centres, the chosen carbonizing plant was an installation of

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CORRESPONDENCE : SMOKE IN THE MIDLANDS

To the Editor,

Journal of the National Smoke Abatement Society.

Sir,

In the paper on "Smoke Abatement in the Midlands" published in your last issue, the account of the manner in which smoke, grit, fume nuisances are successfully dealt with, will undoubtedly be of special interest to many persons where the staple trades do not show such variety of nuisance.

Judging from the enormous number of chimneys abounding in Birmingham, one might expect it to be a city of continuous darkness; however, the chimney figures might easily mislead unless one knows the circumstances. Most visitors find the atmosphere on the whole, much cleaner than that of Sheffield and many other northern towns.

For ten years the writer made about two hundred and fifty visits annually to Birmingham factories; mostly in a supervisory or advisory capacity, whilst engaged as Outside Manager for a midland firm of boiler makers and engineers, and was thus brought into intimate contact with most of the furnace users and boiler plants in that city. I found that in comparison with some of the northern textile towns, many of the midland city's chimneys are almost toy-like affairs, and a single works may contain many such chimneys; the fuel consumption per chimney is fairly small and it is probable that the heating and other process furnaces employed in the metal trades greatly outnumber the boiler furnaces. Impressions of the boiler houses were:—

- (1) small number of large batteries of boilers.
- (2) small number of mechanical stokers.
- (3) not many mechanical aids installed to assist in boiler operation.
- (4) boiler firing usually regarded as not requiring much skill and placed among the lower paid jobs.

Mr. Farquharson informs us that there is little difficulty in dealing with the emissions of grit, etc., in Birmingham. Here again, the position varies in different districts, and I find that where grit emanations come from a chimney connected to a type of furnace which is well away from similar plants discharging similar grits, evidence as to the identity of the offending chimney is easily obtainable, and no trouble is experienced where the emissions can be seen emerging from the chimney top with the naked eye or binoculars as in the case of carbonised wood chippings and paper grits. The writer has successfully dealt with a number of such cases both by statutory notice and legal proceedings.

The real problem arises when there are, say, about one hundred tall chimneys within a square mile, the whole

area being covered at times with fine grits, which with suitable winds may be deposited evenly for more than a mile from the point of issue; where the furnaces of nearly half the boilers are equipped with similar type mechanical plants and burn fine slacks, and all are capable of discharging grits as much alike as the sands of the oceans. One may obtain slides, bottles and bags of grit—proof of grit from somebody's chimney—but not sufficient evidence to all magistrates to show that the grit in question came from one particular, i.e., the defendant's chimney.

If the furnace user is willing to co-operate in grit tests upon his own plant, the path of the investigation is much simplified as several methods are then available for tracing the grit. Unfortunately co-operation is not usually welcomed where the trouble is greatest, especially if the information obtained might be used as evidence in a prosecution.

It is a surprise to see that classes in Boiler House Practice and Smoke Abatement, cannot be formed in a large industrial city like Birmingham. In some West Riding towns with a population of not more than 20,000 such classes are held every winter.

In a careful investigation of over three hundred cases of excessive smoke discharge during the past six years, the writer found that 87 per cent were due, either to ignorance or carelessness in the operation of the plant. Such conditions must operate in many towns, and as a preventative measure, classes of instruction form an invaluable method of reducing ignorance and negligence. Such matters cannot be properly dealt with in the short time at the disposal of the inspector during the course of ordinary works visits.

A special effort is sometimes required to get the classes going, and to obtain the interest and help of manufacturers who employ stokers. One method is to send out letters to the leading employers, giving examples of boiler plants operating at low and high efficiencies; stressing the economics which may be obtained by handling the available plant to the best advantage, also the necessity of greater knowledge and training for the average stoker, in order to produce steam at the lowest cost. The employers are invited to a conference, along with the Medical Officer of Health and the Trade Union Representative, with a view to forming the classes. The direct interest of many firms is thus obtained, nearly all are willing to post up the notices in their works describing the classes, whilst the works managers often personally advise suitable men to attend. The fees charged are usually much below the standard charges, and when the men obtain a certificate the fees are often repaid by the employers.

E. CLEGG, Bradford.

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SMOKE ABATEMENT

By J. T. DUNN, D.Sc., F.I.C.

(Concluded)

Regional Committees.

Ancillary, perhaps to legislation is the formation of Regional Smoke Abatement Committees. These are advisory Committees only, having no powers, formed of representatives of the County Boroughs, Boroughs and District Councils of an area. Their work has been to aid local authorities in carrying out the provisions of the act, and also to get into touch with the producers of smoke and endeavour by argument and persuasion rather than by threats or compulsion to interest them in the attempt to reduce it. The Regional Advisory Committee in our own area, of which Alderman David Adams is chairman, and Dr. Charles the Medical Officer of Health, honorary Secretary, has persuaded eight of our local authorities including the Newcastle City Council, to make bye-laws under the 1926 Act.

Considerable improvement has been effected during the last few years by the introduction of mechanical stoking for boiler plants, and where hand stoking is still in use, something has been done by the education of stokers. In many cities classes have been held for stokers, among them our own city, where at Rutherford College 28 stokers attended classes twice weekly for 16 or 18 weeks. Most of the men were reported as being very keen to acquire knowledge of the subject. The City and Guilds of London Institute have lately issued a syllabus for examinations in Boiler House Practice, and classes in connection with this are to be carried on at Rutherford College next session. There is no doubt that much can be effected in this way, for a man who understands the principles that underlie his work is likely to take interest in it and carry it out efficiently. At a conference in 1935, Mr. Clinch, Smoke Inspector for West Ham gave tabulated information from 13 towns where such classes had been held; 11 out of the 13 testified certainly to improvement in conditions traceable to the effect of these classes.

The use of coke as a boiler fuel has been advocated, and it is certain that coke could be used in many furnaces now using coal with great advantage from the smoke abatement point of view.

The introduction of pulverised fuel with the complete combustion of the fuel that it allows, is another influence working towards the diminution of smoke. It is true that in many powdered fuel installations the finely divided condition of the ash causes a large proportion of it to be carried up the chimney, and that this causes a nuisance when it descends; but this does not darken

the atmosphere as coal smoke does, and it is after all, only dust or very fine grit—not greasy or dirty, and easily removed.

Perhaps the most important agency in reducing the smoke from boiler plants is the electric transmission of power. The power for a whole district, generated in one large and efficient installation, causes a production of smoke almost negligible in quantity, when compared with the aggregate of the small plants which it serves, and each of which formerly had its own boiler installations. Even ten years ago Mr. Sloane told me that power taken from the Newcastle Supply Co. had extinguished over 150 boiler fires in the district exclusive of colliery plants; and that number must have considerably increased since then.

Metallurgical operations, pottery, brickmaking, and similar industries, cause a great deal of smoke, and are more difficult to deal with than boiler plants; but even there, partly through the use of gas, partly through improvements in the construction of furnaces or kilns fed with solid fuel, it is now possible to carry on smokelessly many processes that formerly emitted smoke in great quantities. In our own district I am told that gas has been used successfully in place of solid fuel, in heavy forging, drop stamping, annealing forgings and stampings, rolling mill reheating furnaces, heat treatment of alloy steels, and in the melting, extruding, rolling and annealing of non-ferrous metals.

Domestic Smoke.

When we come to domestic smoke we find a different state of things. We have an aggregate effect, due to the integration of an enormous number of insignificantly small units. The aggregate effect is very obvious—a walk over the Tyne Bridge about nine o'clock on a winter morning, or on a larger scale, a view of the residential west end of Newcastle from Whickham or thereabouts on a Sunday morning leaves one in no doubt as to its magnitude; but it is very difficult to convince the individual householder that he contributes sensibly to it, and that it is his duty to the community to try to lessen his contribution.

Yet some progress has been and is being made, in this direction. There is as yet an obstinate desire to retain the coal fire in the open grate in sitting rooms; and as far as there is no substitute available of equal cheerfulness, one cannot but to some extent sympathise with it. In other ways however, where a fire is wanted temporarily, as in dining rooms or bedrooms, gas fires are rapidly increasing—I learn that Newcastle Gas Co.

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sell 6,000 in a year. And the substitution for the old kitchen range, of a gas cooker and a coke stove for the supply of hot water, is also extending—the Gas Co.'s sale of Gas Cookers nearly reaches 9,000 per annum. Some of these coke stoves are made apparently as repulsive and inhospitable looking as it is possible to design them, but others when open, give as bright and cheerful a fire as any open grate. Electric radiators and cookers are not so common, but their use is increasing and in many modern flats all the heating is done electrically, except for one open grate in the sitting room.

The Open Grate.

How, then, can this open grate be dealt with? What can be burnt in it, other than coal, that will be smokeless, and yet give a cheerful fire needing no more attention, to light it and keep it going than coal. There are two possibilities. One is coke—ordinary gas coke or oven coke, now marketed in the form of nuts of every convenient size. Not every ordinary grate will burn coke, though many, especially those entirely constructed of fireclay, will do so, especially if care is taken in feeding the fire. There are grates specially constructed to burn coke, some of which are quite efficient; but whilst it is easy to put these into new houses, few people are willing to take out the present grate and put in a new one in order to burn coke. An ingenious patent has been taken out by a Newcastle man, which allows coke to be burnt readily in almost any grate. A hole is made in the hearth, which is filled in with an ornamental grating or louver, and the ventilating bricks in the wall of the house are increased in number or in size of opening. The air coming directly from outside under the floor to the hearth furnishes additional draught sufficient to keep the coke burning brightly, and gives a fire as cheerful and bright as any coal fire.

Semi-Coke.

The other possibility is low-temperature coke, or semi-coke, as it is often called. This is an ideal fuel for open grates. It ignites as easily, burns as freely as coal, and gives as lively a fire without making any smoke and its radiating power is considerably greater than that

of coal. It is made, as everyone knows, by carbonising coal at a lower temperature than is used in gas works or coke-ovens; and the by-products obtained, liquid and gaseous, are different in their nature from those yielded at higher temperatures. The gas yielded is smaller in amount and richer in quality; and the liquid products contain less of the benzenoid or aromatic hydrocarbons, and are more paraffinoid. They are consequently under present conditions, less valuable, and a greater share of the cost of the process falls upon the coke. Had this process been developed from the beginning scientifically and as an industrial process it would almost certainly have yielded a reasonable, if moderate profit and might have been worked by this time, on a considerable scale, and have substituted a smokeless fuel for coal in a large proportion of the open grates of the country; but it became the prey of financiers and syndicates, who broadcast exaggerated accounts of its possibilities in the hope of making profits out of the gambling public, and it fell into disrepute. The inheritors of the original "Coalite" process, however, worked steadily on, and are now showing that it is a paying industrial process. They make approximately 400,000 tons of Coalite per annum, and after many years in the wilderness are beginning to make some return to their shareholders. It is greatly to be desired that this or a similar process should be started in this district. No one who has become a user of this low temperature fuel would ever willingly return to coal, and though I am no believer in government subsidies, yet were the government to subsidise this industry on a scale sufficient to make the substitution of low temperature coke for coal in the open grates general, the saving effected in other ways would exceed the amount of the necessary subsidy very many times. Representations have been made to the government urging them to establish plants in the "Special districts" in order to produce oil from coal; but it appears to me that the production of a smokeless solid fuel in large quantity is even more to be desired than the production of oil, because of the effects that would follow its general substitution for raw coal in domestic grates.

Low Temperature Carbonisation, Ltd.

In his Speech as Chairman at the Annual General Meeting of Low Temperature Carbonisation Ltd., on 22nd June, 1937, Colonel Whiston A. Bristow said that "more than 5,000 merchants all over the country distribute "Coalite" and never yet has our production been sufficient to satisfy the ever-increasing demand. To-day, at Barugh, Askern, and Bolsover, we are carbonising over 8,000 tons of coal per week, and, although it is midsummer, every ton is being dispatched as made, and once more we shall have to face the winter with little or no reserve."

Speaking of the future, Colonel Bristow said that this time last year they had only 452 retorts in operation, but by this time next year there should be over 1,000 at work, without including those at Greenwich, owned by the South Metropolitan Gas Company. They had also increased considerably the scope and capacity of their Research Departments and were actively engaged in following up various promising lines of investigation. They had certainly not worked out all the possibilities of the process and anticipated further developments during the next few months.

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Smokeless Coal



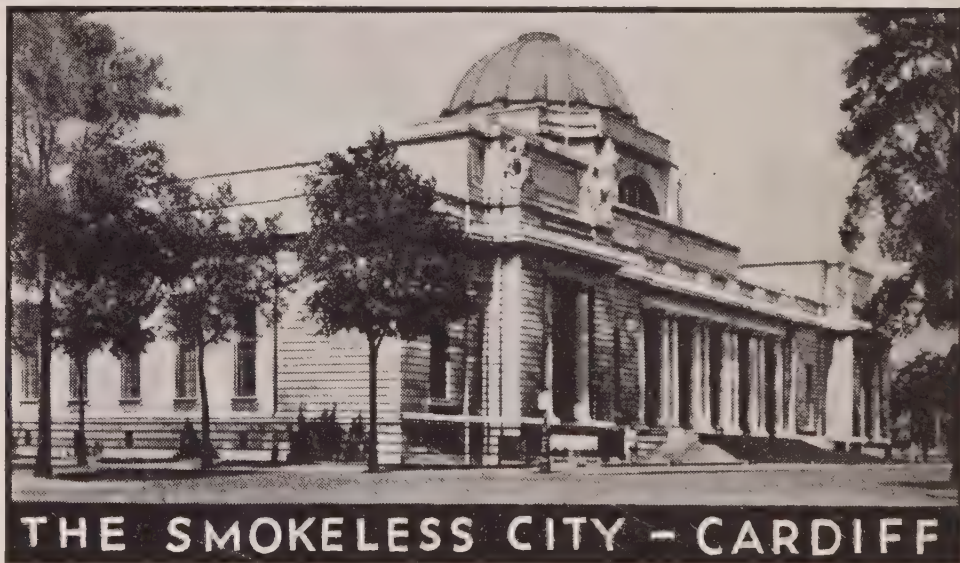
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SMOKE DISCUSSED AT A B.C.G.A. CONFERENCE

A PAPER BY DR. J. J. JERVIS

Dr. J. Johnstone Jervis, Medical Officer of Health for Leeds, was the principal speaker at a conference of the British Commercial Gas Association held at Oldham on 27th May. The Mayor of Oldham, Councillor F. Tweedale, was in the chair.

The title of Dr. Jervis's paper was "Smoke—Friend or Enemy." He said that despite the enormous increase in the consumption of gas and electricity in the last ten years the state of the atmosphere in the majority of towns remained unaltered as regards the smoke nuisance. Working-class houses now, as always, possessed one coal fire, and the gas and electricity appliances had left the coal fire untouched. The new housing estates had merely spread, not reduced the volume of smoke. There was a more hopeful picture on the industrial side, where, in the vicinity of the new housing estates, the light industries were entirely smokeless.

He was credibly informed that where electricity instead of steam was the prime mover there was a very definite saving in maintenance costs, while from an aesthetic point of view there was no comparison.

All sorts of objections were made to the use of gas and electricity by the sentimental who found romance and poetry in the coal fire. Headache, sore throat, asthma, and even hay fever were attributed to them. In their presence flowers were said to wither, and children become restless and irritable and the domestic dog and cat unhappy. But such objections were obviously overdone, and their very exhaustiveness, not to say ingenuity, condemned them. Nothing was said of the damage done by the coal fire to wall decorations, paintings and books, etc.

The Medical Officer of Health did something within the limits of his very restricted powers. He advised housewives not to burn coal in an open grate but to choose low or high temperature coke, gas, or electricity for the heating of their houses. He explained how wasteful it was to burn coal in the uneconomical open grate, how destructive of beauty, how detrimental to health, and how unneighbourly. What was the reply? "There's nothing like a coal fire."

The Single Coal Fire.

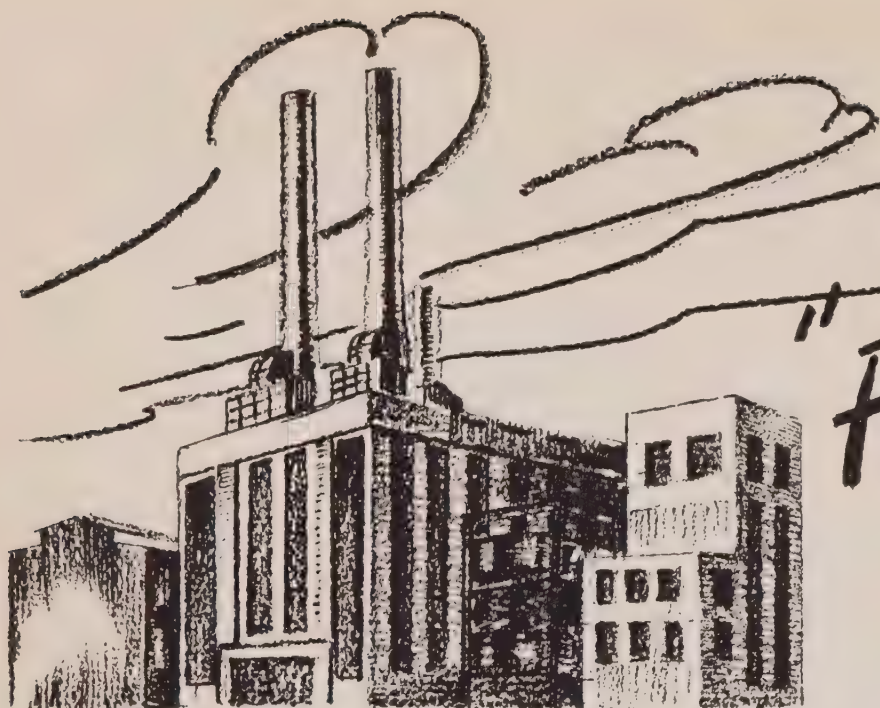
However much they yielded in respect of what might be termed the secondary rooms in the house, they were adamant when it came to the sitting room, which to

them was the sanctum sanctorum, and the unquestioned preserve of King Coal. The principle of the single coal fire was most misleading and deceptive. One fire burning all day could produce an immense amount of smoke.

The time had come when either by pressure of public opinion or some form of coercion smoke prevention should be enforced. No mercy would be shown by the public to the man who deliberately poisoned the water supply to his town. Punishment, swift and condign would justly follow such a dastardly act. Why, then, should the poisoner of the atmosphere escape?

The law which at present dealt only with industrial smoke had only been partially successful, for the reason that it had not been uniformly applied or observed throughout the country. Manufacturers should be compelled to fix mechanical stokers, or to employ as firemen trained and experienced men, who held certificates of competency. The allowance of three minutes emission of black smoke in a period of thirty minutes was too generous and could be reduced by 50 per cent. without any hardship. Electricity and gas should be used to replace steam, and it might even pay local authorities possessing electricity undertakings to sell electricity at a loss if by so doing the air could be cleansed and the health of the people thereby improved. A satisfactory substitute for coal was wanted, and he believed that coke met this need. Parliament should prohibit the use of raw coal in any form except for certain scheduled industries, and collieries and gas undertakings should lay down plant sufficient to coke the bulk of the coal brought to the surface and used in the domestic grate. It would be for the Government to see that there was a protected market for the disposal of the residuals of petrol, benzole, heavy oil, tar and ammonia. There was no reason why the coal product of the earth should not be controlled just as much as the water product was, and the waste of our coal deposits prevented. If gas and coke would bring in the golden age of smokeless skies, they should push them for all they were worth, and drive the truth home to the minds of those who were now sitting in the darkness of the smoke they themselves had produced.

Among those who took part in the discussion were the Medical Officer of Health for Oldham, Dr. J. Chalmers Keddie, who spoke of the curative properties of sunshine and its undoubted mental effect.



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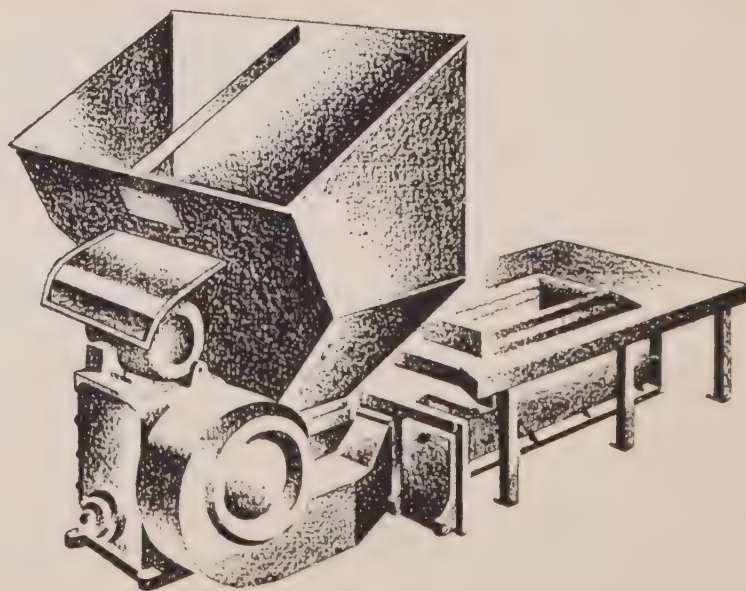
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THE PROBLEM OF RAILWAY SMOKE

A MEMORANDUM TO THE COMPANIES

As a result of the resolution passed at the Science Museum Conference last year a memorandum on the subject of smoke from railways has recently been sent to the principal companies concerned. The text of the memorandum is printed in full below, and in itself explains how the material it contains was obtained.

It is hoped that the sending of this will not be the end of the matter, and the Companies have been asked to let us have their views and an indication of what steps they may be able to take to improve the position.

The memorandum reads :—

I. At the Annual General Meeting of the National Smoke Abatement Society, held at the Science Museum, South Kensington, on 17th October, 1936, the following resolution was adopted :

“ Resolved :

That this meeting of the National Smoke Abatement Society requests the Executive Committee to take up with the Companies concerned the question of the abatement of smoke from railways in towns.”

The resolution was duly considered by the Executive Committee, when it was resolved that in the first place the Secretary should communicate with the towns likely to be concerned with the nuisances from railway smoke, requesting information on the extent and nature of such nuisances and the views of the authorities concerned regarding their abatement.

II. In reply to a letter asking for such information replies were received from 45 Local Authorities, usually from the Medical Officer of Health, representing the larger cities and towns and other districts in which excessive railway smoke was experienced.

III. An examination of the replies received indicates that the nuisance of smoke from railways is generally considered to be a serious problem. Taken in the order of frequency with which they are mentioned, the principal causes of such smoke appear to be as follows :

1. Smoke from engine sheds, during the firing-up or steam-raising period.
2. From locomotives during shunting operations and from locomotives waiting in sidings.
3. From trains standing in, drawing out, or passing through stations.
4. From the trimming of fires.
5. From tunnel ends and tunnel ventilating shafts.

The first two classes are general and clearly constitute the most serious causes of smoke emission. The third is experienced more seriously when the line is in a cutting or on a gradient.

IV. The views expressed, considered as a whole, indicate :

1. A desire for improvement of conditions even in cases where the nuisance is not sufficient to cause action to be taken, or where difficulty in taking action is present.
2. An appreciation of the attitude of the Railway Companies and local officials when approached on the subject.
3. A marked appreciation of the benefits of electrification from the point of view of improving atmospheric conditions.
4. The need for the full co-operation of the Railway Companies and of local officials in improving conditions, which can be assisted by ensuring proper care in firing, by control by officials in charge of sheds and sidings, and by consideration of the type of fuel used for any particular purpose.

V. Special points mentioned in individual replies include :

1. That the design of the troughs in engine sheds should be altered and that the troughs should be connected with a main duct with a fan exhausting into a reasonably high chimney.
2. That smoke from sheds when a large number of locomotives have been cleaned and are lighting-up can be reduced by arranging that only a limited number of furnaces are started up at a time and that ample time is given for steam-raising. That there is a tendency for fires to be forced.
3. That consideration should be given to assisted draught to engines to accelerate the firing-up process.
4. That there should be courses of instruction for firemen.
5. That “ the remedy appears to be electrification of the railways or use of Diesel or internal combustion engines. If it should be found impracticable so far as main lines are concerned, it does appear to be necessary and practicable in densely populated districts.”

VI. The information received may be summarized as follows :

1. That the greatest benefits could be obtained by considering the problems associated with firing-up and shunting operations.
2. That much could be done by specific training or instruction on smoke prevention to firemen.
3. That the administrative side of shunting and firing-up could usefully assist in securing improvements.

VII. In view of the information obtained from these replies, together with the frequent mention or complaint of railway smoke that is met with by the Society, it cannot be doubted that smoke from this source forms an important proportion of the general smoke nuisance of our towns and densely populated areas. To minimize smoke from railways would therefore be a valuable contribution to smoke abatement in general, and locally (i.e. in the neighbourhood of engine sheds, sidings, and stations) would result in a decided improvement in conditions.

While recognizing and appreciating what the Railway Companies have already done towards solving an admittedly difficult problem, the Society considers that many practicable and economical improvements are possible, and begs respectfully to urge that the Companies should give the question their close and continuous attention, both technical and administrative.

We have noted the extent to which railway engineering and administrative research has been developed, and are confident that if this particular problem could be examined in a way similar to that adopted in connection with other questions, the improvements that could be obtained would be recognized and appreciated by the general public and railway passengers, and would be directly and indirectly of value to the Companies themselves.

We do not consider that it would be appropriate for us to make definite proposals on the nature of the specific investigations that may be made, but we may perhaps be permitted to suggest that technical investigations could be directed to securing : (a) the reduction of the amount of smoke from engine sheds, during the steam-raising period. The possibility of the adoption during this period of smokeless fuels or alternative methods of firing, or the provision of a hot-water supply at a suitable pressure from stationary plant operated under efficient combustion conditions, might be considered, and (b) the reduction of the amount of smoke during shunting operations. The wider (and eventually exclusive) use of engines of the Diesel type or of engines fitted with steam accumulators instead of boilers might be considered.

Finally, we beg to urge that the question in general might be considered as a more important and concrete factor in railway working than possibly it is at present. We would also suggest that in considering questions of electrification of railways the complete abolition of smoke that is so obtained should always be included as a factor of importance. There is no doubt that to passengers and to those living in proximity to railways it is one of the most valued benefits of electrification.

On behalf of the Executive Committee,

CHARLES GANDY, *Chairman*.

ARNOLD MARSH, *Secretary*.

14th July, 1937.

PLEASE NOTE :—

LEEDS CONFERENCE

Thursday Evening, 30th September

TO

Saturday Afternoon, 2nd October

SUBJECTS FOR DISCUSSION :

The Regional Committees

Smoke Abatement and Town-Planning

Education and Smoke Abatement

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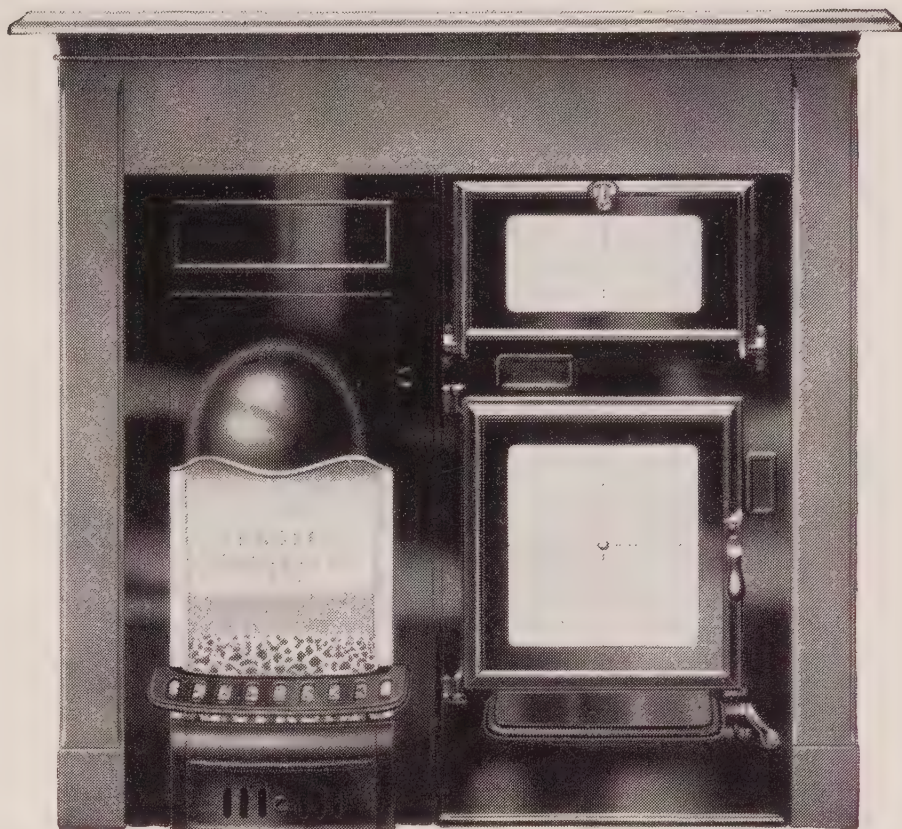
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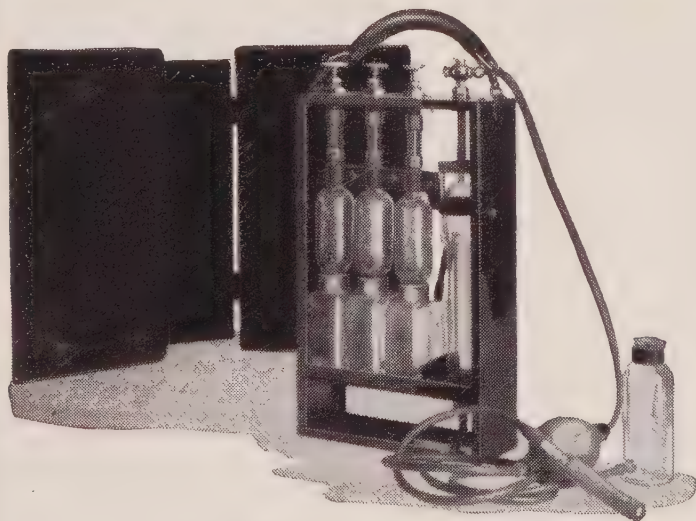
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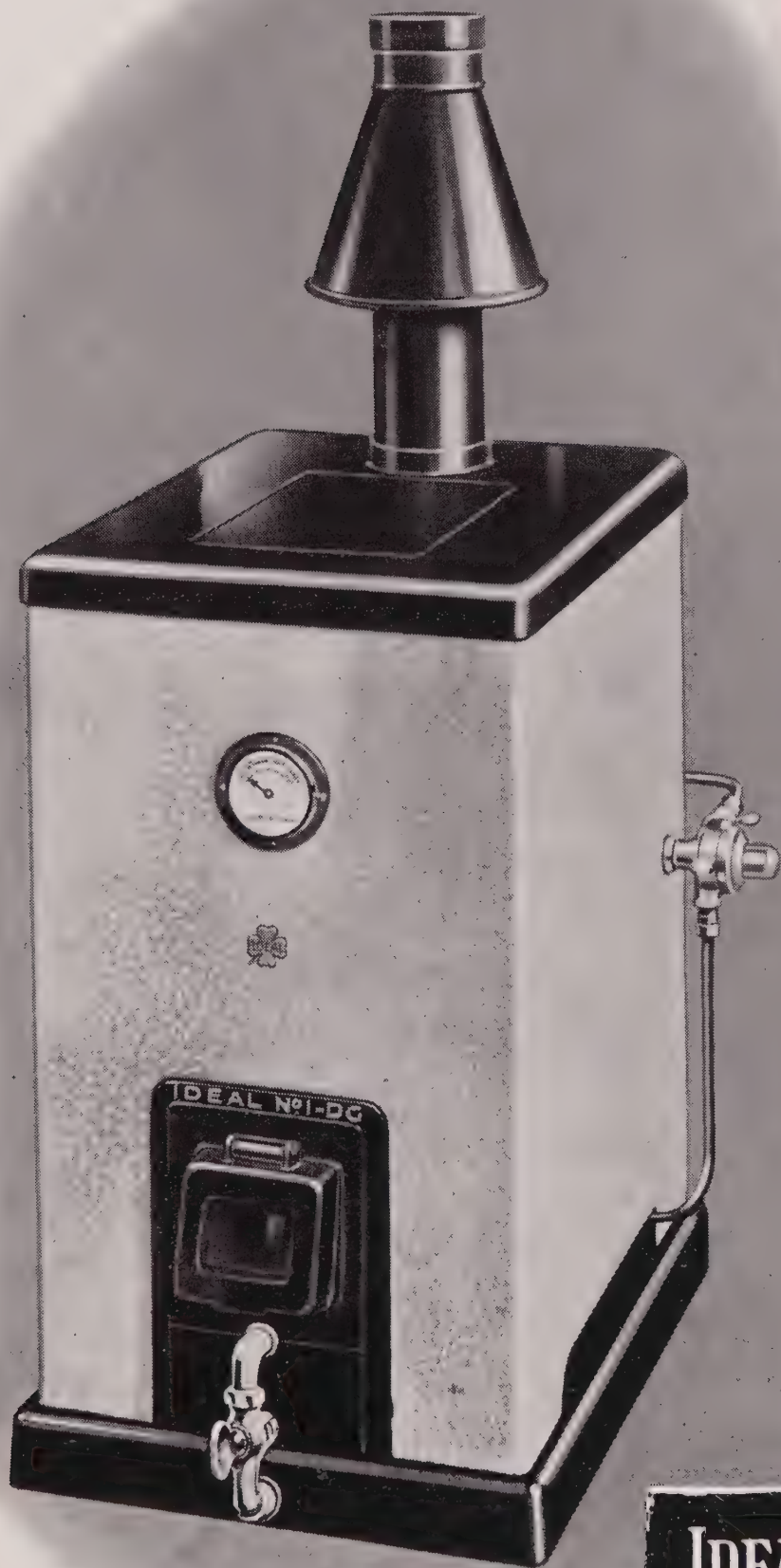
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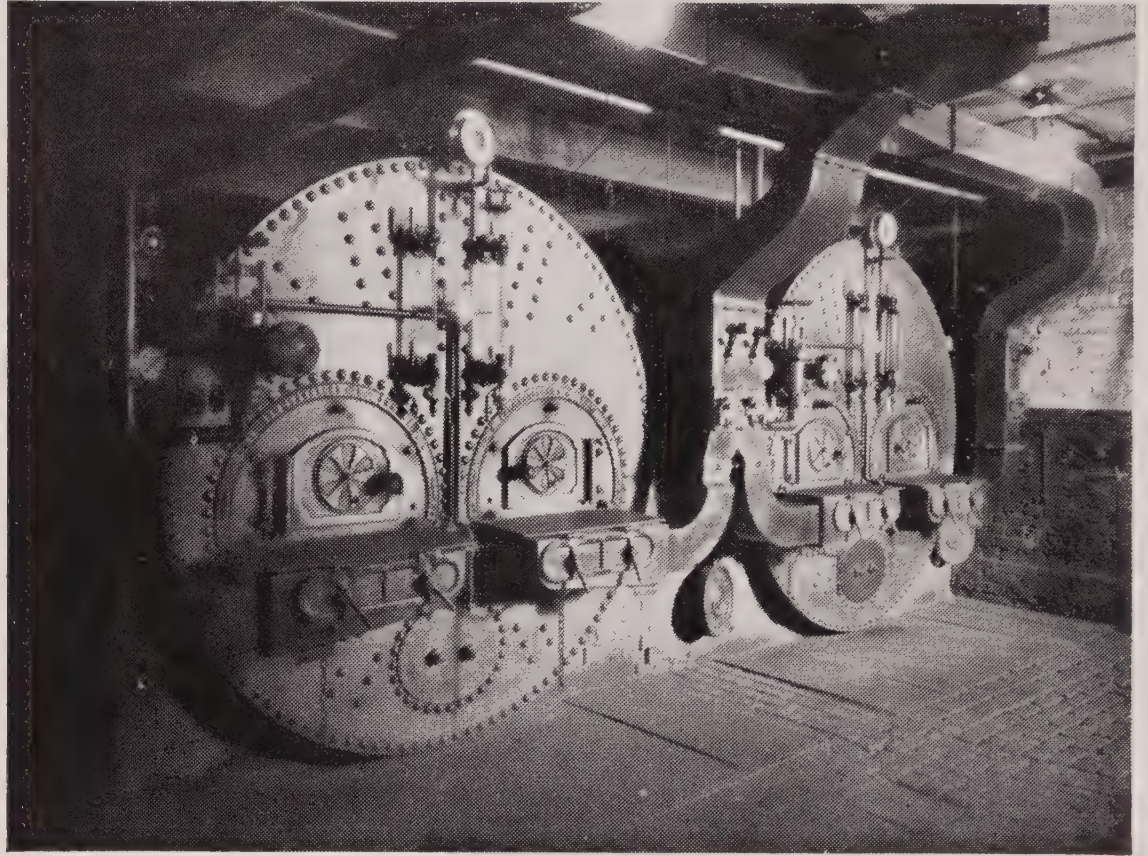
THE JOURNAL OF THE NATIONAL SMOKE ABATEMENT SOCIETY

VOL. VIII.
NO. 32.

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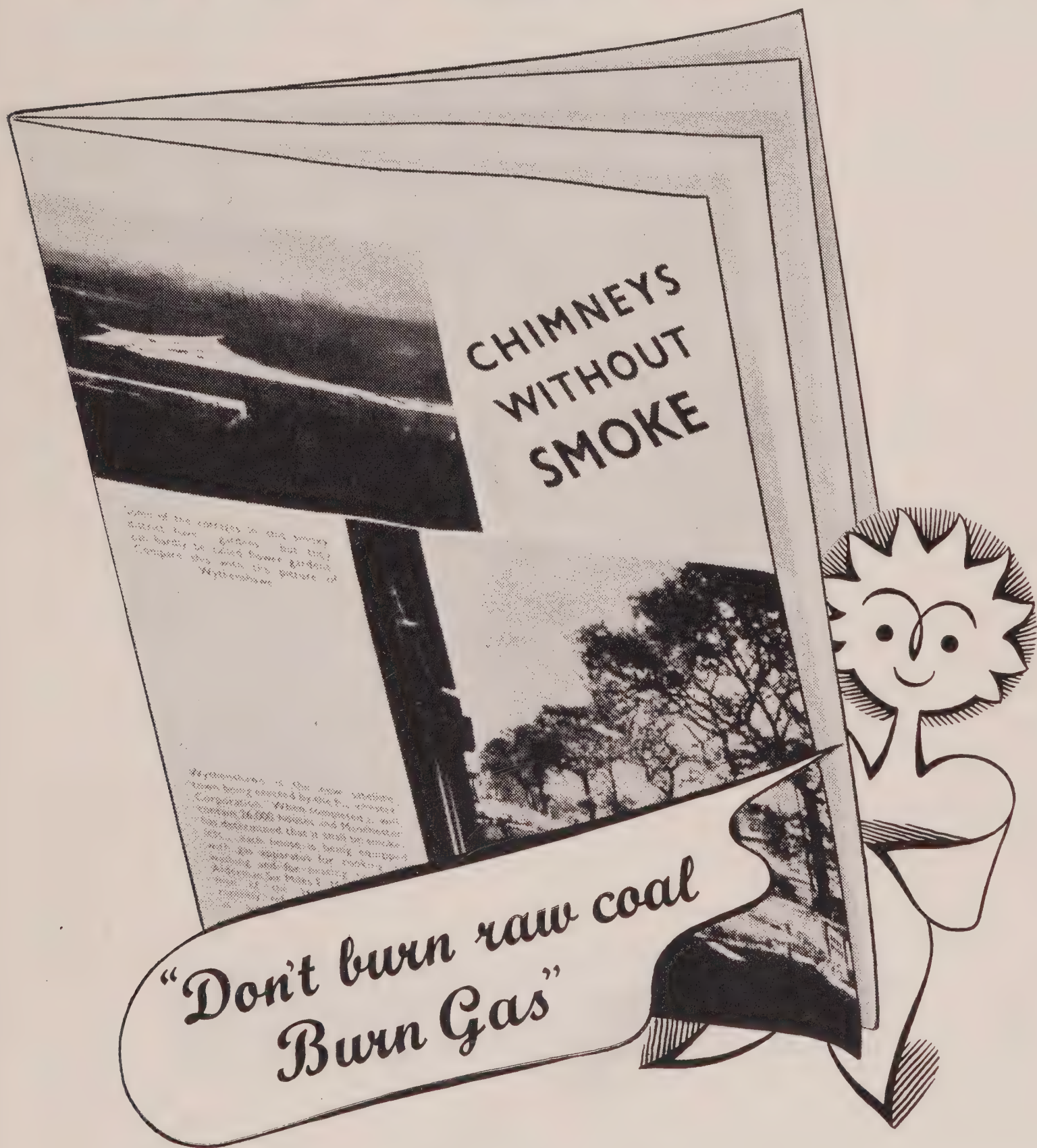
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The Journal is open for free discussion of all aspects of the smoke problem, and the opinions expressed in contributed articles are not necessarily the same as the views of the Society. Quotations and abstraction of matter appearing in the Journal is welcomed, provided the usual acknowledgements are made.

COMMENTARY

THE Leeds conference is reviewed on another page, and its papers and discussions will, of course, be published separately under the title "Proceedings of the Leeds Conference, 1937." It is sufficient here to say that it was easily one of our best conferences, with plenty of meat for the delegates to digest, and with an attendance of nearly two hundred, apart from members of the West Riding Regional Committee and other equally welcome visitors. Next year we are to hold our first conference in Wales—in the city of Cardiff.

One of the most valuable methods of education and propaganda that a movement such as ours can possess is the film. Smoke abatement in particular is a subject that would lend itself magnificently to cinematic treatment and with skilled and imaginative direction a vivid and convincing film of the case against smoke could be made. There is only

one difficulty which has prevented us from going ahead with what is almost an essential requirement, and that is, of course, the problem of cost. An adequate film—adequate that is in both quality and length—cannot be made under several hundred pounds, and today it has to be a "talkie," which adds to the expense. Although we have gone into the question from time to time it has never been possible to find the necessary money, and the project has had to be postponed. Now, however, a member of the Society has very generously offered to contribute £100 to the making of a film. It will be most unfortunate and ungrateful if we are not able to accept this offer, but before we can do so we shall have to seek for further similar offers. Four or five more members could between them make a good film a certainty. May we appeal to anyone who can afford, to do so, seriously considering whether he or she will help smoke abatement in a really

important way? It would be possible to arrange for the film to be shown, even though in a shortened version, on the screens of the public picture theatres, but apart from that it would be in frequent use, for a long time to come at exhibitions and lectures, in schools and film shows of various kinds. In recent years documentary films have become highly popular and include some of the finest examples of cinematic achievement. With adequate resources a film on smoke could be made a creditable, though modest member of the class of film that is not easily forgotten. There is no need to talk about the power and appeal of the film, for we all know what it can do, and we can easily visualise what it can do for smoke abatement. And so, ladies and gentlemen, as they say at the auctions, what offers?

Even though the national headquarters of the Society have left Manchester, that important city remains strongly garrisoned by the North-Western Branch—up to recently known as the Manchester, Salford and District Branch. With a clear field for its own activities, the Branch has recently been reorganized and in various ways will exert a steady influence, not only in Manchester and Salford, but in all the North-West. Miss Marion Fitzgerald, who was “in” smoke abatement even before the time she wrote “The Smokeless City” with Sir Ernest Simon, is co-operating with Miss Dorothy Tripp, the Secretary, and together they will make sure that the move of the national headquarters to London is no excuse for Manchester and the North neglecting smoke abatement. All members of the Society who are in or near Manchester are earnestly asked to help in every way they can in making the Branch a busy and effective organization. Letters should be addressed to Miss Tripp or Miss Fitzgerald, at 65 Barton Avenue, Deansgate, Manchester.

The Metropolitan Borough of Southwark has just opened a new building for its Health Department, and has reserved one large room for a

permanent health exhibition. One section of this has been allotted to smoke abatement, and we have been glad to have had the opportunity of supplying and arranging the material for this. A permanent exhibition of this kind is most valuable and if other local authorities make similar arrangements we shall hope to have our subject adequately represented. Some of the Society's exhibits have been in use at the Marseilles Fair, where a stall was occupied by a recently formed Smoke Abatement Committee for Marseilles and District. We hope that this new organisation will meet with success in its work, and that we may be able to co-operate with it again from time to time. One of the forthcoming health exhibitions in which the Society is to take part will be staged at Messrs. Derry and Toms, in Kensington, from November 9th to 20th. Members who visit the exhibition should find it easy to persuade their wives to come along too!

“What the C.U.C. Has Done” is the title of a pamphlet surveying the work carried out by the Coal Utilization Council since its formation in 1932. Much attention is given to the tonnage of coal consumption saved or won from oil, but of greater value to smoke abatement is the fact that in 1936 the Council received some 12,000 applications for the services of its engineers from fuel users and fuel suppliers. The assistance given must be of considerable benefit in securing better combustion conditions and hence reduction of smoke. Some of the activities of the Council, especially with respect to the domestic uses of coal, can only be given our disapproval, but on the industrial side and in the research that is being undertaken on domestic appliances, we can express our appreciation. The report states that through the research in progress it is hoped that “the problem of smoke from the domestic fire, of which so much is made by its competitors, and which is admittedly its chief disadvantage, is in a fair way to solution. Such a solution would, it is believed, be of the very greatest value to the domestic coal trade.”

Leeds Conference, Presidential Address.

“ IDEALISM ”

By H. A. DES VOEUX, M.D.

All nations, from the beginning of history, have had their ideals. Even among savage races principles of hygiene and prophylaxis are observed, which, though they may be wide of the mark when judged by modern scientific standards, are usually elaborate and certainly sincere. Where ghosts have been dreaded, not as gruesome phantoms, but as a real and present danger, men have taken precautions to prevent the return of their dead. These precautions generally involved extensive rites of purification. Sometimes the door by which the body was borne out of the house was sealed up, and the dead man was ferried across water to a distant place of burial by his relatives, who were afterwards required to bathe themselves and wash their garments before returning. It is not difficult to see in such rites a blind but not ineffectual attempt at disinfection. Those ancient races which attained high standards of civilization had their own codes of cleanliness, and the rules laid down by the early leaders of such peoples were by no means cursory. The Hindu Vedas*, for example, instructed the healthy man to rise an hour before sunrise, brush his teeth with a powder made from tobacco, salt or burnt betel-nut, using as a toothbrush a twig from some appropriate shrub. He was next expected to polish his tongue with a scraper made of gold, silver, copper or, if his economic position did not run to any of these, with a split twig ten fingers long. The mouth was then rinsed with cold water several times and the face washed. The eyes were treated with antimony and the nose with rape seed oil, which was believed to keep the mouth sweet, improve the voice and prevent the hair turning grey. He was also instructed to consult his looking glass frequently, as this practice improved the complexion and prolonged life. He was required to take at least one bath a day, to anoint himself with oil, and to indulge in regular physical exercise. This regime of cleanliness and physical activity could not be outstripped in the English public schools of to-day—which, indeed, still lag behind the Hindus on a few points, such as the frequent use of the mirror.

The ancient Israelites were no less sticklers for cleanliness, as we may read in the book of Leviticus. Here we find not only precepts of personal hygiene, but edicts governing the cleanliness of the city as well. The priest was called upon not only to diagnose leprosy in one of his flock and to act according to the law, but to deal also with leprosy in a house. What was meant by leprosy in a house it is hard to say; perhaps it meant

a house in which a leper had dwelt, but the description suggests rather some sort of rot or fungus in the walls of the house itself. The passage runs:

“ And he shall look upon the plague, and, behold, if the plague be in the walls of the house with hollow strakes, greenish or reddish, which in sight are lower than the wall;

Then the priest shall go out of the house to the door of the house, and shut up the house seven days;

And the priest shall come again the seventh day, and shall look, and behold if the plague be spread in the walls of the house;

Then the priest shall command that they take away the stones in which the plague is, and they shall cast them into an unclean place without the city.”

(Leviticus XIV, 37, 38, 39, 40.)

Cleanliness was an ideal with the ancient Greeks, as their open cities and their temples to Aesculapius, Hygeia and Panacea showed. The temples of Aesculapius, commonly situated on wooded hills or mountains near mineral springs, were nothing less than hospitals where the sick, attended by physician priests, were treated by bathing, massage and sleep.* The Romans too, with their baths and aqueducts, were apostles of clean cities and citizens.

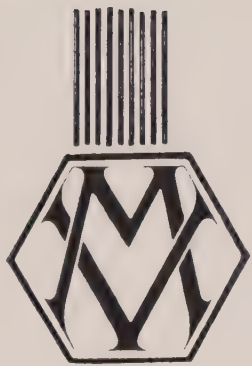
How was it then, that with these ancient ideals of cleanliness, personal and civic, before them, Europeans of the middle ages slipped into a disregard of hygiene so profound that we cannot remember the splendour and romance of those days without an ironic after-thought of filth, primitive sanitation and foul smells? The change from a love of cleanliness to its disregard is one of the strangest that man, in all his vagaries, has ever allowed. It was a change induced by apathy, not by a lack of idealism but by a passionate clash of ideals in which cleanliness failed to find acceptance upon the side of the angels.

To us, to-day, science and religion no longer seem at war. We seek truth as best we can in every field which lies open to us, nor feel that in doing so we are offering an affront to the things of the spirit. But in the middle ages the position was very different.

When Rome fell to the invaders in the fifth century the whole world was stunned. The foundation of power which had nourished a vast empire for generations was suddenly dried up. The subject nations had to get along as best they could, and they turned with confidence and faith to the great organization which could best support them at such a crisis—the Catholic Church.

* Ref.: “A History of Aryan Medical Science,”
by Sir Bhaquat Sinh Ice.

* Ref.: “History of Medicine,” by F. N. Garrison.



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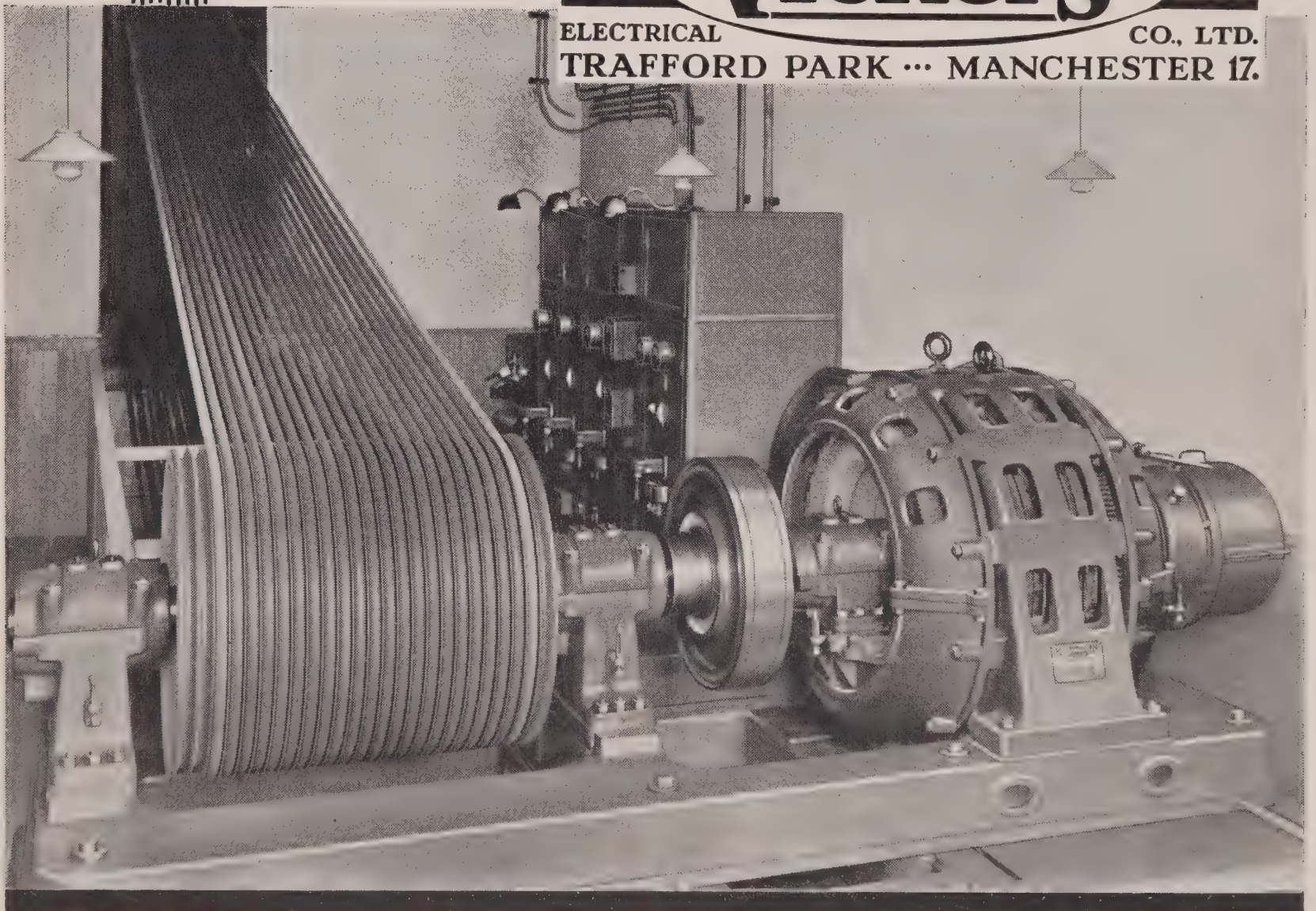
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The Church brought with it great spiritual gains—the Christian virtues of compassion for the weak and care of the sick. But it brought also its spiritual restrictions. Learning, at that time, was the province of the Church and her servants, and mediaeval thinkers were all under the ban of authority. Most of the learned entered the Church to find refuge from the turmoil of the outer world and opportunity for study. They were given their opportunity, but their studies were carefully delimited. For example, physical science and medicine were taught from abridged and much translated versions of the ancient classical writers, and the use of any other books was forbidden. Nor was it permissible to attempt to establish facts of natural science by experiment. Truths were regarded as stationary, and the final judge in any controversy was the Church. It is a fact that at this time the works of Aristotle were taught in the schools of the west from a Latin translation of a Hebrew translation of an Arab commentary upon an Arab translation of a Syriac translation of the Greek text.* This attitude could not fail to paralyse any true advance in knowledge and the principles of public hygiene and cleanliness suffered, with other scientific principles, not merely an arrest but a reverse. Knowledge unless it is growing, begins inevitably to decay.

But in addition to this enchainment of learning, the Church brought with her a mystical ascetism, derived from the East, disdainful of carnal things. Mind and matter were separate entities. The spirit was eternal, the poor body but the dust which housed it, to be scorned and as far as possible ignored. It was this contempt for the body, and for the things of the world, which led to the strange divorce of cleanliness from godliness, and which, so Clifford Allbutt tells us, "in a few generations turned the cleanest people in the world into the most filthy."

Now, all this may seem to lie very far from the subject of smoke and smoke abatement, but in fact it is this old idea which has governed us since the fall of Rome, and governs us still to-day if we are to judge by practice. The fate of the body, for the mediaeval thinker was supremely unimportant. If man fared wretchedly here below, he would live blissfully hereafter; the ills and petty inconveniences of life on earth would be amply compensated in heaven.

He said and believed :

"Heaven is our heritage,
Earth but a player's stage." †

There is nobility in the thought, but its practical results were deplorable. What use, men thought, to extend much labour upon a world in which they were but brief sojourners, born to trouble as the sparks fly upward. So the cities of the middle ages were magnificent fortresses, abominably drained and the roads were miry tracks where refuse was flung. Epidemics and

plagues swept the country, and were regarded as visitations of God for sin. Even the Renaissance with its tremendous stimulus to learning could not shake ideas so deeply implanted in the hearts and habits of the people. Dirt and disorder were tolerated as necessary evils, and if smoke was not classed among the greatest of these it was imply because wood smoke is less offensive and harmful than coal smoke.

Coal was not used in England before 1239, when Henry III granted a license to the city of Newcastle for the digging of coal; and it was not for centuries, of course, that the bulk of coal consumed became sufficient to pollute the atmosphere to the extent it does to-day. Yet even in those times smoky air gave offence, for we find Chaucer in the fourteenth century declaring roundly from the lips of the wife of Bath :

" . . . smoke

And chiding wives, make men to flee
Out of their own house."

Pride in clean cities was no outstanding virtue of Tudor times, even under glorious Elizabeth, as the old story of Sir Walter's cloak indicates. Shakespeare speaks of winter as a time when

"Blood is nipped and ways be foul"

as a matter of course. And again and again he reminds us how brief is our inheritance of this earth :

"We are such stuff

As dreams are made on, and our little life
Is rounded with a sleep."

In the seventeenth century the quantities of smoke poured out over the city of London was sufficient at least to arouse the attention of the inhabitants, even apart from the volume contributed by the great fire. Indeed, smoke was seldom produced to better purpose than in that fiery destruction of old London, in whose rat-ridden, filthy houses the plague had run riot. Nor had there been any signal advance in providing clean streets. Splashes from passing traffic were so commonly expected that those with velvet or satin clothing to preserve walked on the inner side of the footpath near the wall. This is the origin of the custom by which the male escort takes the outer side of the pavement, to shield his woman companions from the mud. To "take the wall," as it was called, was the prerogative of persons of quality; lesser fry made way. When two gentlemen of consequence encountered, of course a nice situation arose in which the weaker finally went, not to the wall, but into the gutter, or even into the next world. Samuel Pepys tells how :

"Two men . . . jostling for the wall about the
New Exchange, did kill one another, each
thrusting the other through."

A sorry outcome of a lack of civic pride. John Gay, a century later, could still comment upon the difficulty of judging—

"When to assert the wall, and when resign."

In Pepys' day the air of London was not only polluted with smoke but rendered offensive by evil odours,

* Ref. : "Science and Mediaeval Thought," by Clifford Allbutt.

† "In Time of Pestilence," by Robert Nash, 1567-1601.



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some of which derived from the rotting limbs of traitors impaled above Aldersgate. It is hard to understand how the citizens of London could tolerate such a practice, but not incredible when we remember that little more than a hundred years ago the bodies of law breakers were left dangling on the gibbets.

Contemporary of Pepys, that good citizen John Evelyn, staunch enemy of smoke, wrote hopefully of a London perfumed with the scent of flowering shrubs. In his diary he tells how he sat with the commissioners considering reforming the buildings and streets of London.

"... and we ordered," he wrote, "the paving of the way from St. James's North, which was a quagmire, and also of the Haymarket about Piccadilly and agreed upon instructions to be printed and published for the better keeping of the streets clean."

Here was a beginning of civic pride in cleanliness, and evidently not before it was sorely needed. Evelyn also tells, with great interest, how he saw Sir John Winter preparing coke, which he describes as—

"... a project of charring sea-coal to burn out the sulphur and render it sweet. ... What success it may have time will discover."

By the eighteenth century the foundations of modern scientific method had been well laid, but practice yet lagged behind discovery. Edinburgh housewives still cried "Gardylloo" as they emptied their slop-pails from the upper windows of tenement houses into the streets below.

The industrial nineteenth century did little to improve

matters, rather the reverse; for though the paving and cleansing of streets became more common, the towns sucked in population from the country-side. Overcrowded slums added to the squalor of cities where the emissions of factory chimneys were blackening the air with soot and eating at the stone of ancient buildings. London fogs acquired the reputation which they have never lost, and the regular pea-souper of Dickens' Christmas Carol can still be duplicated in our own time, now and then.

Can we, to-day, pretend that we have recovered the ancient Greek ideal of clean and open cities? Even now we tolerate in our midst the existence of slums whose vermin infested hovels are breeding grounds for disease. We are still content to live in cities which are periodically blotted out in fog, and permanently wasted by sulphur-bearing fumes. Content? If we are content with this we may as well be content to live in the pig-styes we deserve, and have done with it. Whatever our views on life and death it ill becomes us to leave our world to posterity in the same unkempt and grubby state in which we find it.

Would that the inhabitants of all our towns should become Idealists with regard to the buildings "within their walls" not only as to the architecture but as to preserving the structure from the destructive fumes emanating from fires and furnaces. If every citizen were an Idealist the City Fathers would have the authority and could exercise the power to clean the atmosphere so as not to despoil the continuous gift which nature presents to us with no unstinting hand.

Pollution Observations in Manchester.

It is gratifying to note, from the recently issued health report for 1936, that after a break of many years observations on atmospheric pollution have been started again in Manchester. This is being done in co-operation with the D.S.I.R. Atmospheric Pollution Committee, and seven gauges have been put into operation in representative places. Three lead peroxide cylinder apparatuses, for the measurement of sulphur activity, have also been installed. It is interesting to note that for the first year's results, the average deposit (total solids) for the seven gauges was 263 tons per square mile, compared with an average for four gauges in 1926 of 447 tons.

The Report states that during the year 525 times observations on industrial chimneys were taken, with 83 cases of black smoke emitted for two minutes or over in half-hour periods. In addition 262 observations of locomotives on railways were taken, it being stated that "many cases have occurred of smoke emissions from railway locomotives, but the difficulties associated with the collection of necessary evidence have prevented the institution of legal proceedings."

The Report contains the annual report of the Manchester and District Regional Smoke Abatement Committee, which is reviewed elsewhere. It also contains the report of the Manchester Committee on

Cancer, which refers to research upon the problem of atmospheric pollution caused by the exhaust fumes from motor vehicles propelled by heavy oil engines. "These fumes contain proportionately a lot of soot and tar and when inhaled, may affect the health as much as do the fumes from the chimney of the domestic and factory coal fire." The investigation is being made at the request of the Institution of Automobile Engineers. "An Excellent Wash-Out."

"There must have been some really good actinic value in the sunshine over quite a large area north of Manchester during the week-end; for once in a way the smoke filter had been washed out. The torrential rain on Friday night had cleared the air of dust and smoke, but the week-end was also the beginning of one of Bury's holiday periods, with the result that on Saturday there were very few mill chimneys proudly flaunting their plumes of smoke as they toiled to put the dirt back into the newly washed atmosphere. So in the country round Bury one could both feel and see the difference; the air felt cleaner and fresher, even in the hot sunshine, than it does normally, and the shadows cast on the roads and fields were definitely stronger and blacker. For once the countryside was receiving sunshine that had something like its proper value in it."—"Miscellany" *Manchester Guardian*, 9th August, 1937.



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THE PARIS CONFERENCE ON SMOKE

REPORT TO THE INTERNATIONAL UNION OF LOCAL AUTHORITIES

As mentioned in the last issue, smoke was one of the two subjects discussed at the recent Paris conference of the International Union of Local Authorities. M. Humery of Paris, a mining engineer who has studied the subject closely, acted as reporter to this part of the conference, and sent to each country represented a detailed questionnaire. The replies to this questionnaire have now been published, together with an introduction and a general summary report by M. Humery.

In his introduction, M. Humery shows the link between the two subjects and with truth states that man has shown a diabolical perseverance in seeking means for poisoning himself, and that our civilization wastes millions of money in creating the evils from which it suffers and which are only partially remedied by spending more millions.

The general report is printed below and indicates the wide scope of the questionnaire. The replies, some of which are of considerable length are printed in the full report, while the introduction and a summary to the discussion at the meeting are published in the September issue of "Local Government Administration," the organ of the Union. Replies to the questionnaire were received from Germany, Great Britain, Austria, U.S.A., Greece, Hungary, Luxemburg, France and Holland. That from this country was prepared by Dr. J. Johnstone Jervis.

General Report.

I. The Technicians.

1. *Work of Town Planners.* The remedies unanimously recommended by town planners are : zoning, that is the prohibition of factories in residential areas ; the use of smokeless mediums such as coke, gas, electricity ; a greater use of district heating ; a greater height of chimneys, especially industrial ; a greater use of smoke consumers and soot-catchers.

2. *Work of Doctors and Hygienists.* Numerous works have denounced smoke and dust nuisances, which are classified as : chemical pollution, including carbon monoxide, sulphurdioxide, anti-pinking compounds (in motor exhausts), bad odours ; physical pollution, including dust in the air at breathing level (clogging and irritation of the lungs) and in the upper atmosphere (diminution of sunlight and especially of ultra-violet radiation.)

3. *Work of Toxicologists.* All the reports insist on the necessity of control over town atmospheres, especially with respect to carbon monoxide.

4. *Work of Physicists and Chemists.* Work has been done in particular on the methods of analysis, both of the atmosphere and the products of combustion, and on the electrical precipitation of dust (France).

5. *Work of Meteorologists.* Numerous researches on the influence of smoke on the formation of fogs and of climatic conditions in large towns (America, Britain, France).

6. *Methods of Carbon Dioxide Analysis.* The baryta and soda methods are generally used (France).

7. *Methods of Carbon Monoxide Analysis.* The iodine pentoxide method is that generally used. But other methods make use of hollamite (U.S.A.), blood (France), amido-iodide and palladium chloride (Germany). Automatic indicators, with thermocouples, are used in the U.S.A.

8. *Methods for Sulphur Dioxide Analysis.* Usual methods. English chemists have codified the details to a fine technique.

9. *Measurement of Suspended Impurities by Deposit.* The apparatus universally used is the Owens dust counter (Britain) or its derivatives.

10. *Measurement of Suspended Impurity by Filtration.* There is a similar success for the British automatic air filter recorder.

11. *Measurement of Suspended Impurity by Jet and Adhesion.* The method most in favour is the Owens Jet Dust Measuring apparatus.

12. *Measurement of Suspended Impurity by Discharge.* Not used.

13 and 14. *Measurement of Suspended Impurity by Electrical Precipitation and Conductivity.* Not used. An ingenious method for thermal precipitation is mentioned by Britain.

15. *Measurement of Suspended Impurity by Photometry.* A new Hungarian method by Dr. Elisabeth Frolich is mentioned but not described. The Ringelmann chart, because of its simplicity and notwithstanding its lack of precision, has had a world wide success.

16. *Miscellaneous Methods.* Nothing reported. N.B.: Public Health Bulletin No. 217 (U.S.A.) describes in detail the apparatus and mode of use for most of the above mentioned methods.

17. *Measurement of Dust by Plates.* A simple and precise method, universally used.

18. *Measurement by Funnel Gauge.* Same remark.

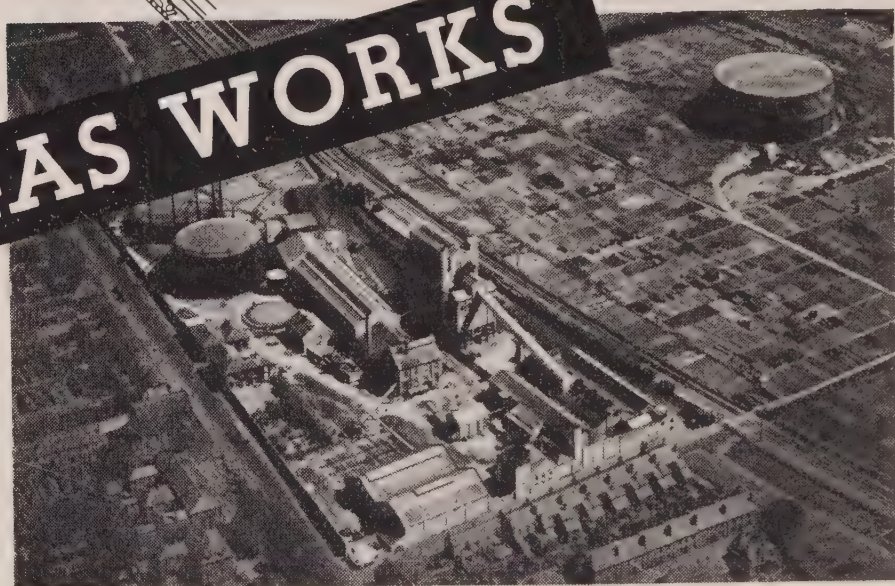
19. *Methods for the Measurement of the luminosity or nebulosity of the sky.* There can be mentioned a German ultra-violet ray meter, the Chalumeau-Desjardins method (France), the Robitzsch actinograph (Germany), the ultra-violet ray meter of Ashworth (Britain), and the classical methods of potassium iodide or methylene blue.

20. *Can a true idea of the extent of pollution by dust be obtained?* Full reports have been issued in the U.S.A. and Britain, and in France for the cities of Paris and Lyons.

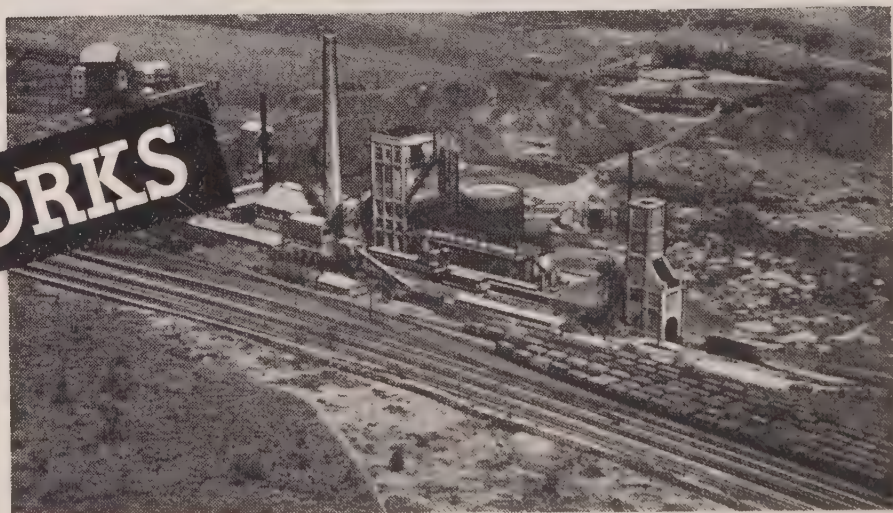
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T.G.S.

21. *The same question for toxic gases.* There is little new work.

22. *Recent general publications on the question of smoke.* In Britain, the publications of the National Smoke Abatement Society. In America, the reports of the Public Health Service, and in France M. R. Humery's work.

II. Public Authorities.

23. *The Law Against Industrial Smoke.* There exist laws against industrial smoke only in England (1875 and 1926), in France (1932) and in the United States (local legislation in 125 cities). But in all countries there are laws for the protection of public health which apply—as does even common law—to industrial smoke.

24. *Laws Against Smoke from Private Premises.* No effective legal restraint seems to exist, against the smoke from private premises. In Britain it is possible for bye-laws to be made relating to heating and cooking, but it has not been possible to make use of this provision.

25. *Decrees, Orders and Regulations Enforcing the Law.* There may be mentioned the English regulations, those of American cities, some of which are very comprehensive and the prefectorial decrees of France.

26. *Do these laws concern cases of every type?* The replies are negative for every country.

27. *Penalties.* In general, the penalties are light.

28. *Are the regulations observed?* There are frequent complaints of the lack of effectiveness of the law, except in Britain.

29. *Do local authorities possess powers?* Yes, either through a special law or in virtue of common law. The French report states that the local authorities have generally relied on persuasion, and the Hungarian report observes, with justice, that when the proprietor of a defective furnace is in a difficult financial position he can hardly be refused relief from the enforcement of the law. In Holland the inspectors concerned have the right to enter habitations in the course of construction and houses in which public sales are held.

30. *Does legal action produce results?* Always. The improvement is 60 per cent. in England, 75 per cent. in Lyons (France).

31. *What amendments to existing legislation are suggested?* Specific legislation is especially required where at present there is none at all, as in Hungary. Nevertheless Germany, Greece, and Holland, for example, are content with the general enactments. In Britain a greater severity in the definitions of smoke is asked for. In France, it is urged that the local authorities should be more continuously active.

32. *Co-ordination between the central government and local authorities.* This co-ordination appears to exist everywhere in principle. In particular, in Germany there are travelling state courses for furnacemen and mechanics, and in Holland local health commissions appointed by the central government are in touch with the local councils.

33. *Is there a central office for smoke prevention?* In Germany there are five central organisations concerned with the question; in Britain the National Smoke Abatement Society and the Department of Scientific and Industrial Research. In Holland there is the National Institute of Fuel Economy.

34. *What towns have created a municipal organisation for smoke prevention?* In Britain these include Newcastle, Manchester, Liverpool, and also county committees such as Yorkshire and the Midlands [Regional Committees, all of the same nature.—*Ed.*]

In France, Lyons and the health departments of such towns as Lille, Courbevoie, Boulogne-Billancourt, etc., and the Prefecture of Police, Paris.

V. Public Opinion.

35. *What reception has been given to the regulations enforcing smoke prevention by the public?* In a very general way, favourably. However, organized protests have been made (France).

36—40. *What attention has been given to the campaign by the technical press?* Numerous technical articles throughout the world.—*By the daily and local press?* Numerous articles. The U.S.A. press has given the question "enormous publicity."—*By tourist associations?* Little.—*By scientific associations and at congresses?* In nearly every country scientific associations are frequently occupied by the questions and have included it in their congress programmes.

41. *Is there a bibliographical index?* In France the "Chambre Syndicale de la Fumivorité" publishes an index for the use of its members. The Ministry of Public Health collects articles. Similarly, in Germany there is the library of hygiene of Berlin-Dahlem. In Britain and the U.S.A. there are numerous bibliographies.

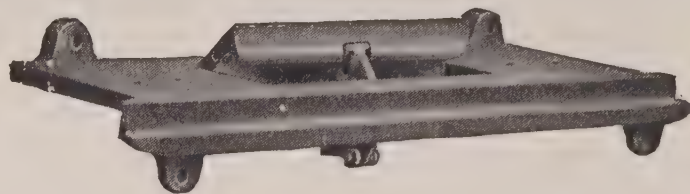
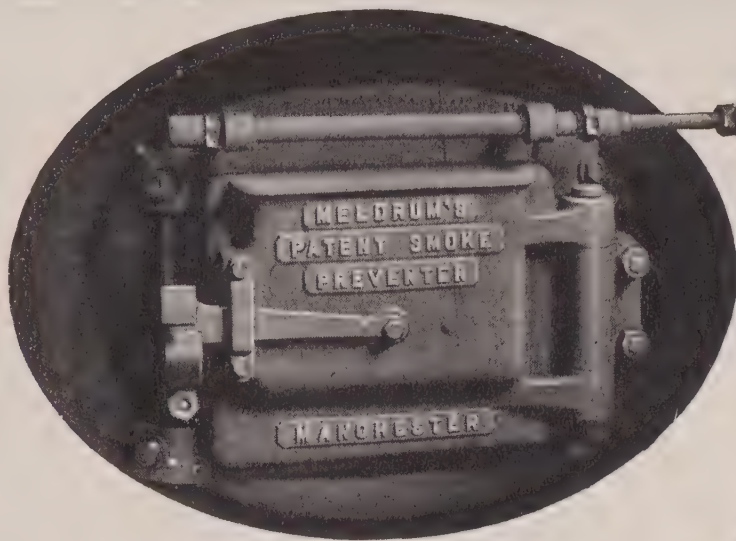
VI. Individuals.

42—46. *Is there an increasing use of coke and of gas for domestic purposes?* Unanimous reply: yes, everywhere.—*Of electricity?* Yes.—*Of district heating?* The movement in favour of distant heat distribution, of which Germany and the U.S.A. were the initiators, is beginning to progress everywhere.—*Of other smokeless methods for domestic purposes, such as automatic or underfeed stokers?* Yes.—*Of soot catchers?* Their use is developing, especially in France. Costing little, they do much to improve the atmosphere of the large towns.

47. *Are users informed of the dangers of failing to maintain stoves in good condition?* Replies very variable. The question should be considered more carefully. The advice which has appeared in the French press could be used as the basis of articles in the press of other countries.

48. *Similar question for flues.* Similar reply.

49. *Similar question for motor vehicle exhausts.* There appears to be little attention given to this. But the atmosphere of all the large towns becomes less and less breathable with the success of heavy oil motors. The



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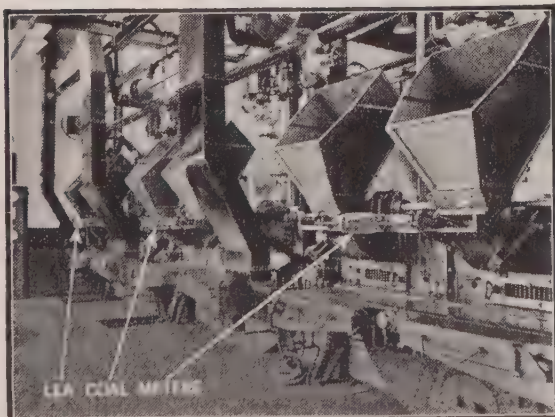
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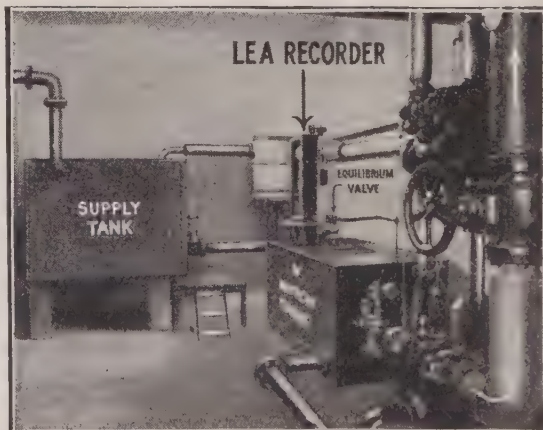


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question demands vigilant attention. The danger of tetra-ethyl lead is recognised, and it has been prohibited in several countries.

50. *Similar question for stationary engine exhausts.* Little attention has been given to this.

VII. Manufacturers and Producers of Electricity and Fuels.

51—93. Each country has given lists of manufacturers often very fully, for which the reader is directed to the separate reports. He will then appreciate the immense effort that the inventors and manufacturers have made for the prevention of smoke, and the wastage of calories that accompanies its emission.

One can say that nowadays all the products and processes form an extensive range from which almost any requirement can be filled. The difficulty is to know what to choose: each apparatus will not satisfy every case, and the help of an impartial specialist is often necessary.

We would like to give a word of advice to manufacturers: that is to restrain the ardour of their publicity and sales services, and not to advocate the use of any products in cases where they will not be fully satisfactory. Nothing is more prejudicial to a manufacturing firm than the lack of success of a product that is ill-adapted for the desired end.

The cost of appliances has been the subject of serious investigations.

VIII. Industrial Users.

94. *Do publications on the smoke problem, published by industrial associations, exist?* It seems that only in Germany do the associations for the sale of fuels issue explanatory publications for their clients.

95. *Do Manufacturers' organizations exist for internal supervision or inspection?* ("police interieure contre les fumees"). In Britain there is the Fuel Economy Section (of the Federation of British Industries) and the Coal Utilization Council. In Holland there is an "Association to Encourage Smokeless Heating." In France attention is given by the steam-users associations.

96. *Is there collaboration between manufacturers and local authorities?* In France the town of Lyons has initiated a definite procedure for this collaboration. In many French towns the Health Department will advise manufacturers, often with good results.

97. *Efforts of Public Authorities against smoke from their own furnaces.* In Germany, Britain and France such authorities have modified their furnaces with a view to reducing smoke. The example thus given is one of the best forms of propaganda for the individual consumer.

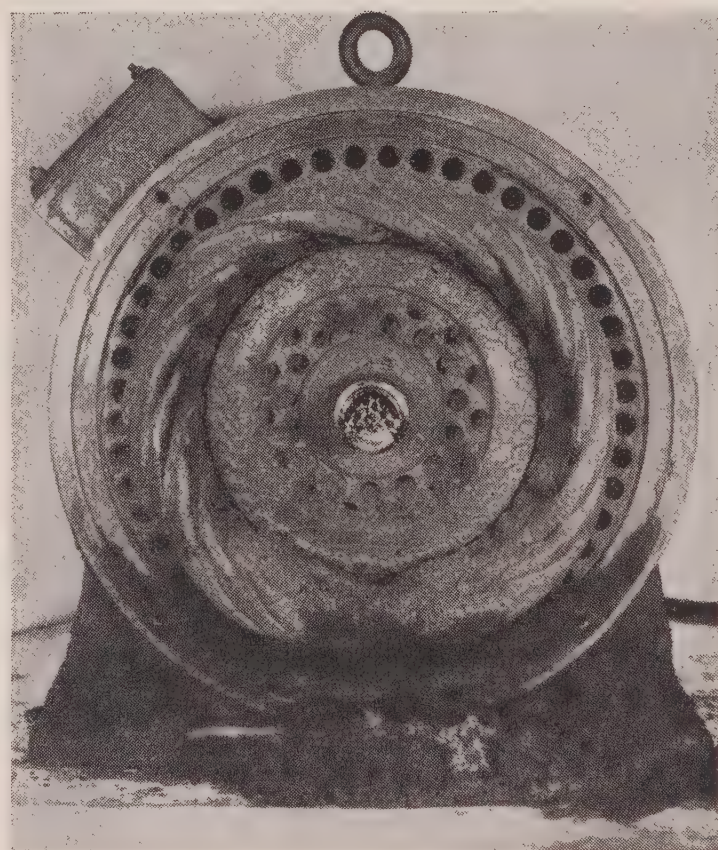
The general report concludes with a series of recommendations addressed to the various professions and interests which are concerned with the problem.

DUSTY ANSWER

"A.E.I. News," the "house organ" of Associated Electrical Industries, Ltd., published an interesting article in its September issue on "Electricity and Smoke Abatement," by Frank Walker, M.I.E.E. One of the interesting points mentioned in the article related to the accompanying photograph, and to quote from the article, this "shows a special motor opened up after 3,360 hours running in a dirty workshop. Air was drawn by an internal fan through round ducts in both the stator and the rotor, the experiment forming part of an investigation into the deposition of dirt in motors. It will be observed that the stationary stator ducts are comparatively clear, while, due to centrifugal action, the moving rotor ducts are almost completely choked."

"One result of this investigation has been that in the A.E.I. group companies' totally-enclosed fan-cooled motors, no external air is either passed through rotating ducts, or brought into contact with the working parts. If human lungs can get into a condition anything like that shown in this illustration, the prevalence of respiratory diseases in urban districts can easily be understood."

We are indebted to the Editor of "A.E.I. News" for the loan of the block and for permission to reproduce.



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PRESS CUTTINGS

PRINCIPALLY ABOUT THE CONFERENCE

Do We ?

The National Smoke Abatement Society's speakers still regard themselves as so many voices vainly crying in a dirty wilderness.—*Birmingham Post*.

Leeds Replies.

Dr. H. A. Des Voeux, President of the National Smoke Abatement Society, arrived in Leeds yesterday. He appears to have discovered before he got very far that Leeds has a smoke abatement problem. After that smoke seems to have got in his eyes, for he saw little else worth seeing, if we are to believe him. Replying to the Lord Mayor's address of welcome last night, he said Leeds had no buildings worth looking at, except one or two modern ones—like the Civic Hall We can forgive him, for he appears to have had an extremely busy day, as he groped his way, choking and gasping in our awful atmosphere.—*Leeds Mercury*.

Charge Admitted.

It is the business of civic heads to boost their cities and towns when they welcome conferences, and Mr. Tom Coombs, Lord Mayor of Leeds, followed common form in telling the National Smoke Abatement Society about the glories of Leeds. It is the privilege of the host on such occasions to throw a little dust in the eyes of visitors, but the success of the operation seems to have been impeded in this case by the smoke that was already there Candid criticism need not be resented. It corrects complacency by calling attention to defects. The charge that Leeds is not a clean place must be admitted.—*Yorkshire Evening Post*.

Cleanliness.

The formal opening of the National Health Campaign seems to provide the appropriate background to the discussions upon smoke abatement which started today. A clean atmosphere is as essential as clean water and if we overcome our inveterate habit of self-disparagement we can find satisfaction in the accomplishments of our time We have progressed, and we are capable of making still greater progress. If we will be pigs we had better be content to live in the pigstyes we deserve.—*Bradford Telegraph and Argus*.

Worthy of Trial.

The campaign to rid the air of our cities of some of the filth that cuts off the sun from the citizen, trebles his laundry bills, and blackens his buildings is reaching an interesting stage. Speakers at the ninth annual conference of the National Smoke Abatement Society remind us that research and regulation, if vigorously applied, can now remedy what used to be the most obvious source of pollution, the densely smoking factory chimney The struggle of the future is going to be with the home and office. British affection for the

open fire is deep-rooted. There is probably no householder who toasts his toes before blazing coal who would not welcome a diminution in the sootfall, but he sees no reason to abandon an old custom while his neighbours make no move. That is why the smokeless zone idea is so attractive The resulting increase in daylight and cleanliness would repay the expense, and the contrast between the regenerated area and those around it would not improbably lead them to demand the same blessing. The idea is at least worthy of trial.—*Manchester Guardian*.

For Health and Physique.

In these days when more attention is being paid by the Government and Local Authorities and others to the health and physique of the nation and greater efforts are being made to safeguard and improve them, it is well that the grave consequences of smoky and fume-laden atmospheres should be emphasized and seriously considered.—*Lancashire Daily Post*.

Clean Living.

In the national search for health and well-being there is no doubt that the primary requisites are sunlight and clean air today Certainly let us get rid of our slums which are breeding grounds for disease, but while we are doing that let us make the most of that too rare visitor—the sun.—*Yorkshire Herald*.

An Appreciated Tribute.

Mr. H. M. McKay (Leeds) drew attention to the amount of publicity given to the proceedings of the Smoke Abatement Society in Leeds last week. "*The Yorkshire Post*," he said, "came out with three or four columns and double column headings about Leeds being aware that it was smoky." He thought it ought to be known that the Coal Utilisation Council were spending annually on research three times the total income of the Smoke Abatement Society. The public knew what the Society were doing and the amount of smoke which fell per acre, but the blessings of the coal fire enumerated by Lord Horder did not seem to get to the public.—*Yorkshire Post Report of the Coal Convention*.

Electric Washers Blamed for Smoke.

"New additional sources of localised vitiation are the chimneys of wash-houses of private houses where the occupants have installed an electric washer. This apparatus is hired by the hour to anyone wishing to utilize it. A condition devolving upon the owner is to provide the necessary hot water, and this he does by heating the water in the original set-pot, as a consequence of which the furnace may be burning and the chimney emitting smoke for a considerable portion of the days in which it is in use." This extract from the Morpeth Health Report seems to have a moral in it somewhere.



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Members of the Conference at Bolton Abbey

LEEDS

IMPRESSIONS OF THE 1937 CONFERENCE

The first impression of the conference cannot be glossed over : the Lord Mayor's lyrical description of the glories of Leeds during the reception at the Civic Hall. It was a delightful reception, and one felt privileged to be entertained in the beautifully decorated and dignified new building. We felt grateful to the Lord Mayor, not only for his kindly hospitality, but for his pleasing and unusual address of welcome, and for the opportunity this gave to Dr. Des Voeux for a chaffingly fierce reply in which he told the Lord Mayor both what Leeds was and what it ought to be. Everyone enjoyed it, and the Lord Mayor, one felt, enjoyed it most of all. It was good publicity, too, as the banner headlines and news-bills of the Leeds papers showed next day.

Another outstanding impression—once more, alas, on the pleasure side of the conference—is that enormous bouquet of chrysanthemums that Councillor Griffiths of Cardiff so miraculously produced and presented, with a gallant flourish, to Mrs. Jervis, after the speechifying at the tea at Ripon on Saturday afternoon. His inimitable yarns, too, provided an uproarious way of ending an exceptionally fine Yorkshire high tea. And the tea in its turn was a pleasant ending to one of the best tours the conferences have had. The countryside through which we drove, although under grey skies, must have

been a revelation to those who did not know Yorkshire or knew only the big industrial towns, while in Bolton Abbey and Fountains Abbey we saw two of the finest of those magnificent ruins in which Yorkshire is so rich. A word of praise must be said about the scholarly but fascinating descriptions of the abbeys given by Mr. Parsons, whose well of knowledge of the subject seemed to be unfathomable. Our thanks to the Leeds Health Committee were expressed at tea and were no formal politeness but warm and genuine appreciation for a memorable afternoon.

The Conference.

Apart from the Science Museum conference last year, which was exceptional, the attendance at Leeds was the largest yet. The papers were constructional and practical, the discussions were exceptionally interesting and, with few exceptions, to the point. Of unusually outstanding interest were the remarks made by the chairmen, and one felt that these could easily have been expanded into full length papers.

Perhaps not so much came out of the Regional Committees session as could have been expected, although the different points of view expressed were enlightening. The perennial debate of statutory *v.*

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advisory committees naturally took the opportunity of breaking out with all its old vehemence. It was a pity that Dr. Veitch Clark was not there to speak on his paper, for his unusual gift of combined logic and eloquence would undoubtedly have raised the debate to another plane. The absence of Councillor Asbury, another great debater, was also unfortunate, especially as it was due to an accident that morning, but Mr. Law did remarkably well when called upon at such short notice to take over and defend his Chairman's paper.

In the town-planning session in the morning there was a general feeling that we had got on to something very big and important. Mr. Acfield's paper was exactly what we had hoped it would be—the subject from the point of view of the city engineer rather than the smoke abater. Mr. Gandy's paper was on the lines of previous articles and papers, but was infinitely more impressive and convincing. The smokeless zones proposals look like being of primary importance to the smoke abatement campaign of the early future, and it is difficult to imagine a better statement of the case than that which this conference was privileged to hear.

Saturday morning saw the Executive Committee's educational proposals considered, and tacitly agreed upon. The most interesting and valuable part of the session was, of course, the paper by Dr. F. A. Mason, who was representing the Board of Education. It was gratifying to find such sympathy and readiness to help and to realize that this session as with that on town-planning, opened the door to considerable new activities on the part of the Society. The discussion was largely of practical points, although there was some tendency to stray away to other subjects. Of especial interest, perhaps, in view of the proposals that had been made, was the contribution by Mr. Pickston, who, as a science teacher, had a point of view that we were anxious to hear.

The sky over Leeds, all the time we were there, was overcast and dull, and it was that perhaps which made it seem a particularly grey and smoky city. But nevertheless it is a happy place, and a hospitable one too, for such a conference, and there could have been few, if any, who did not thoroughly enjoy it and appreciate its usefulness. For all this we must say : thank you Leeds ; and with particular emphasis : thank you Dr. Jervis !

REGIONAL COMMITTEE NEWS

SOME ANNUAL REPORTS

West Riding of Yorkshire.

The annual report of the Executive Committee of the West Riding of Yorkshire Regional Smoke Abatement Committee for the year 1936-37 has recently been published. The constitution of the committee has undergone some changes during the year owing to the regrouping of local authorities in the area, causing 29 of the 86 constituent authorities to go out of existence. Six new authorities have been formed in their places and so far five of these six have agreed to become members of the committee. The new composition of the committee will be : the West Riding County Council, 7 County and 7 Municipal Boroughs, 43 Urban Districts, and 5 Rural Districts.

The report records the ending of the investigation on metallic substances in atmospheric dust, and refers to the measurement of atmospheric pollution by the authorities in the area. Further sections deal with the conference on smoke between Regional Committee representatives and the Alkali Inspectors, and the question of burning pitheaps.

The Examination Board of the Committee unfortunately has to report a decrease in the number of students attending the classes on boiler house practice, and in the number taking the examinations. During the year courses were held at four colleges and the total number of students attending was 70, compared with six colleges and a total of 112 students the previous year.

Sheffield, Rotherham and District.

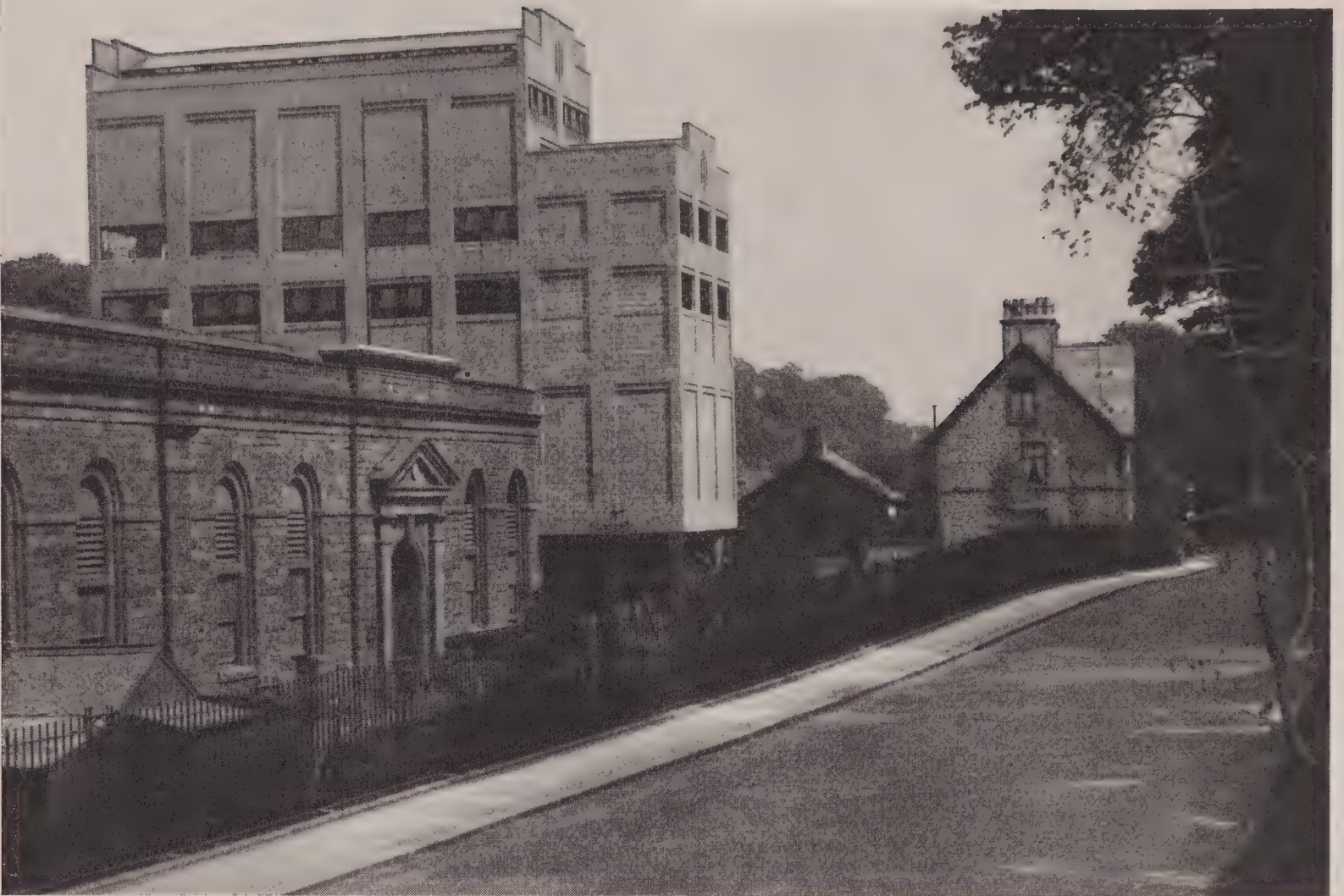
The new report is for the year ended 31st March, 1937. Twelve meetings of the Committee were held, and the procedure followed is indicated by the following extract from the report :—

“ Reports of the Chief Smoke Inspector on the observations taken in respect of various Boiler Chimneys were submitted at each meeting of the Committee. In the majority of cases authority was given for the service of Statutory Notices ; in one or two cases no action was taken, and in the remainder warning letters were sent to the firms concerned.

“ In regard to Combination and Furnace Chimneys, reports were submitted where emissions of smoke from the chimneys concerned were excessive, and, in accordance with the arrangement made with the local Manufacturers' Committee, information as to these cases was supplied to the Secretary of such Committee, with a view to that Committee taking action thereon. In addition, where in such cases flagrant breaches of the “ Standard ” laid down were made, the Smoke Committee requested their Secretary to send special letters to the offenders ; a copy of the letter in each case being sent to the Secretary of the Manufacturers' Committee.”

With respect to possible prosecutions during the year 12 cases were reported to the Committee, but no police court proceedings were taken. Three of the firms put forward schemes of reconstruction, five received warning letters, and with the others no action was taken.

HEALTH RESORT



AT BUXTON, as at all resorts similarly given over to the promotion of good health, purity of atmosphere amounts to stock-in-trade. In the choice of modernized gas works equipment a very big factor was the necessity for smoke-free operation. And, as at many other health centres, the chosen carbonizing plant was an installation of totally-enclosed **GLOVER-WEST VERTICAL RETORTS**

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MILES PLATTING, MANCHESTER, 10

The work of the inspectors is shown by a statistical table giving the number of chimneys observed, number of minutes smoke emitted, notices served, advisory visits made, and so on, for the area of each of the constituent authorities. As an example, 5484 chimneys were observed in Sheffield, 1062 in Rotherham, 316 in Rotherham R.D., 280 in Rawmarsh, and 408 in Stocksbridge. It would incidentally, be more useful if the statistical table gave the aggregate figures for the whole area in addition to the district figures. To outsiders, at any rate, it is of greater interest to know the extent of the Committee's work than how the work was partitioned between the various localities.

The report of the chief inspector has a noteworthy paragraph regarding the metallurgical smoke problem. Pollution in the industrial districts has increased with increased activity but not to the same extent. "The heavy trades," it is stated, "are showing a remarkable example of what can be done in the manufacture of steel with a minimum of smoke. The more extensive use of gas and electricity is having the desired effect, in fact, the supplies of gas are being utilized to their limit and the daily consumption is estimated at 36 million cubic feet. In addition to this a number of works are using producer gas which is manufactured at the works."

Pulverized fuel is being extensively used for reheating and heat treatment processes, and the use of electricity for steel melting and heat treatment processes is advancing steadily.

Boiler smoke, though a secondary problem in Sheffield, is also dealt with, and comment is made on the number of boilers that are not covered or "housed."

Manchester and District.

The report of this committee is printed as an appendix to the Manchester Health Report. The matter of chief interest is the work that is being done by the Chairman (Alderman Jackson) and the Hon. Secretary (Dr. Clark) in visiting local authorities to explain and obtain support for the proposal to form a joint board. In each case the Mayor or Chairman of the Council, the Chairman of the Public Health Committee, and the Medical Officer of Health, were interviewed. Promises of support have been received from a considerable number of authorities when the proposal to form a Statutory Board reaches concrete form. In the meantime further visits are being arranged with the object of persuading other authorities to give their support to the proposed scheme.

The report expresses pleasure at the continued co-operation of the Coal Utilization Council in the work of the Committee. The Council's district Combustion Engineer has been called upon by a large number of firms in the area and the value of his advice with regard to the more efficient working of boiler plants has been much appreciated.

PARTICULARLY FOR NEW READERS

The Society.

- The National Smoke Abatement Society is a voluntary organization wholly dependent on the support of its members.
Founded in 1929 by the fusion of two older bodies one of which was founded in 1899.
- Membership is open to all who are interested and wish to support the movement.
Associate membership subscription is 5/- a year.
- Full individual membership subscription is anything from 10/6 a year.
- Membership subscription for associations, local authorities, and firms is anything from one guinea a year.
Members receive the Journal and various other publications without charge.
Many desirable developments of our work are waiting for the funds that only increased membership can provide.
- Full information is given in the Annual Report, a copy of which will gladly be sent.

The Journal.

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Is the only magazine of its kind in the world.
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- All the advertisers have something that is helping the work of the Society. They are also helping the *Journal* to be published. We ask that you should help them.

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SWANSEA & LONDON

SOLID SMOKELESS FUELS

WITH PARTICULAR REFERENCE TO THE NATURAL FUELS

By a Fuel Technologist

Closed-Stove and Open-Grate Fuels.

The various systems and the agents employed for the heating of homes, offices, public buildings, and so forth, whether solid fuel, gas, electricity, or oil, each have their advantages, some in a restricted sphere, but by far the great majority of the population require solid fuel for use mainly in open grates, kitchen ranges, and in hot-water boilers. In the past, the fuel used for this purpose has been almost exclusively raw smoke-yielding coal. This is an immature product, which Nature very providentially left in a half-finished state. I say providentially because if it had been converted into the condition in which it would yield no smoke during combustion, vast quantities of condensable vapours (oil-producing vapours) and permanent gases would have been expelled and lost during the process. Fortunately, Nature has not been altogether improvident, and it behoves us to see that the energy which she has stored up for millions of years is employed to the greatest advantage, and not heedlessly wasted as is being done when immature smoky coals are burnt in the raw untreated state.

Wasteful Smoky Coal.

The use of smoky coal in the domestic grate is accompanied by serious disadvantages. In the first place, as it is not possible to ensure that any appreciable proportion of the volatile smoke-yielding constituents can be completely burnt in these domestic appliances, quantities of smoke, soot and smuts are produced, which not only foul the atmosphere, but create a good deal of nuisance in the home. Secondly, when using high-volatile long-flaming fuels in the open grate, too great a proportion of the heat passes up the chimney, the advantage of which heat is thus lost. Thirdly, the production of smoke is also a source of loss of heat energy, therefore, smoky coal is a very inefficient fuel, which cannot be said to give satisfaction to any consumer who has any regard for pure atmosphere, the benefits of sunshine, cleanliness, the avoidance of waste, and the efficiency of heating agents.

Fortunately, fuels suitable for open grates, and which do not possess the disadvantages above mentioned can be manufactured from raw coal on an economic and commercial scale, while certain Welsh natural smokeless coals also meet the requirements.

Radiant Efficiency.

The first requirement of an open-grate fuel is that it should possess heat-giving properties, and a large proportion of the heat from the fire must give a high radiant

efficiency. It is now common knowledge that carbonized fuels have higher radiant efficiencies than ordinary smoky domestic coal. Gas coke is one of these efficient fuels, but coke made at low temperatures, or semi-coke has a still higher radiant efficiency, being from 30 to 50 per cent greater than that of bituminous coal. Semi-coke burns more vigorously in the ordinary grate than does gas coke, the former being more free-burning and giving out heat of greater intensity than the latter. Welsh smokeless coal also burns vigorously and gives a high radiant efficiency. The three essentials for the efficient heating of rooms are : (1) Complete combustion of the fuel with the minimum production of noxious constituents, such as smoke, soot, carbon monoxide and unburnt hydrocarbons. (2) The provision of adequate ventilation, with an absence of "mugginess" and discomfort. (3) Reasonable cost, consistent with efficient service. The Welsh coals and smokeless semi-cokes of the class referred to in these notes fulfil these requirements admirably. High radiating efficiency and steady combustion ensure warmth and sufficiently frequent changes of air in the room.

Ash and Moisture.

Closely related to the question of radiant efficiency is that of the presence of ash and moisture in the fuel. Ash reduces the calorific value, and its presence in excessive proportions entails waste of energy. A coating of ash on the fuel reduces its radiating efficiency, and proportions above 8 per cent are generally objectionable. Moisture has to be evaporated at the fire temperature, thus energy is uselessly expended also in this direction. Therefore, good open-grate fuel should contain low proportions of ash and moisture.

Freedom from Smoke.

Another prime requisite of open-grate fuel is that it should burn with the emission of a minimum, or the complete absence of, smoke. The Welsh coals which are low in volatile content evolve little or no smoke, and these can be used without special pre-treatment. Gasworks coke and semi-cokes are smokeless fuels of the class under consideration. Some grades of gas coke, however, are not sufficiently readily kindled, nor are they sufficiently reactive during combustion. Semi-cokes fulfil the requirements admirably, and as a rule can be kindled with great ease.

A coking coal may give excellent results in a grate after the smoke-producing volatiles have been evolved. This is because combustion takes place first while the coke is only half-baked, or in the condition of semi-coke.

“COALITE”

(Regd. Trade Mark)

THE NATIONAL SMOKELESS FUEL NO SPECIAL GRATE REQUIRED

“COALITE” is made from the best of best coal after it has been washed to remove the ash and other impurities. There is only one standard of quality—the BEST.

“COALITE” burns with plenty of flame, gives out great heat, but does not smoke or form soot.

“COALITE” makes chimney cleaning unnecessary and decorations and curtains keep clean for a much longer time.

“COALITE” is half the weight of coal, providing the users with twice as many scuttles to the ton, and thereby rendering it much more economical in use. It is also easier to carry and cleaner to handle.

“COALITE” is suitable for all types of grate, stove or range. No other form of fuel need be stocked.

“COALITE” is easily lit in the usual way with paper and wood. It makes a magnificent fire at low cost, giving out the most beneficial form of radiant heat.

“COALITE” is a national asset. In the manufacture of “Coalite,” Petrol is produced for the Royal Air Force, Fuel Oil for the Royal Navy, Diesel Oil and other valuable products. Also, by the use of “Coalite,” smoke and fog producing elements are eliminated with a beneficial effect upon the health of the people.

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Anthracite burns with great intensity of heat because the pre-ignition stage in its transformation is the conversion of the fuel into charcoal, which is highly reactive. Graphite (bright silvery carbon), on the other hand, is not very reactive to air, and this is the reason why highly-graphitized silvery coke is not a satisfactory domestic fuel for open grates.

With the aid of specially-designed grates, and with gas ignition, good service can be obtained with normal gas coke, but the fuel now being considered is one that can be used in any type of open grate, and one which does not demand the use of a gas poker for ignition.

General-Purpose Fuels.

The fuels should also be economical in use, and should maintain steady heats over reasonably long periods. Fuels which reach the "peak" readily, and then rapidly decline, would not meet with general approval, although they might for other reasons be preferred to raw coal. The fuel should have "body," and not burn too extravagantly. It is a good plan to mix Welsh smokeless coal with a semi-coke which tends to burn too quickly. The mixture is a very satisfactory all-round domestic fuel, as it burns equally well in the open grate and the hot-water boiler. Semi-coke is usually particularly easy to ignite; the Welsh coal is not so readily ignitable, but the mixture causes no anxiety on the score of ignition. There is "body" in the Welsh coal, and the combination is a very desirable domestic fuel. Smokeless solid fuel is the most efficient, cleanest, least expensive and generally most satisfactory agent for domestic heating for British homes.

Smokeless Coals.

The solid smokeless fuels with which we are concerned are the natural smokeless coals, and the manufactured fuels such as semi-coke or low-temperature fuel, gas coke and furnace coke.

The natural smokeless fuels embrace the anthracite of South Wales, and the smokeless Welsh coals of low volatile content, known generally as the Admiralty coals on account of their superiority as navigation smokeless fuels in the days before the Admiralty decided to employ oil almost exclusively for the Navy.

Anthracite.

Anthracite is Nature's finished product, from which all the smoke yielding constituents have been driven off in the process of formation. Smoke cannot be produced from this fuel. It is a black shiny product, dense, hard and compact. It is relatively heavy, that is to say, it is of high specific gravity. It has a high carbon content, low volatile or gaseous content, therefore it gives practically no flame during combustion. The ash content of Welsh anthracite is generally very low, and its calorific value, or heat-giving property, is high. It is not regarded as being generally suitable for modern

barless grates, on account of the fact that it is rather difficult to ignite, and requires a fairly strong draught. Further, a deep fuel bed is essential to ensure good results. It is, however, used in all sorts of old-fashioned Victorian bar-type grates and cooking ranges in the anthracite district of Wales, and glorious fires can be obtained with it. When used under proper conditions, it gives great satisfaction, requires a minimum of attention, and is economical.

There are several well-known types of slow-burning stoves, which are highly efficient and attractive in appearance, which may either be used closed or with open fronts, giving satisfactory service combined with ease of control. As a general rule, continuous uninterrupted combustion throughout the winter is assured with fuel of the right grade and quality, and a suitable stove.

Semi-Bituminous Coal.

Smokeless steam coal differs somewhat in character from anthracite, in that it contains more volatile substances, is less difficult to ignite, burns more freely and requires less draught. Some of these coals have also the property of becoming converted into coke under the action of heat. These coals are not so hard as anthracite. Those approaching anthracite in character are described as semi-anthracites, while those higher in volatile content are termed semi-bituminous. They give short flames during combustion, but practically no smoke; some are quite smokeless. The ash content is low, and the calorific value high. They are heavier than ordinary domestic coals, but lighter than anthracite, being less dense than the latter.

These coals burn vigorously, but not extravagantly in open grates, of the bar type for preference, where they give great satisfaction. Semi-well grates can be adapted to burn coals of this type very successfully, with the aid of fairly simply constructed fitments, costing from 12/6 to 20/-.

Some of these coals will not coke, while others have feebly-coking properties. When using nuts or cobbles of the latter, the coals open out on the fire, and a close-grained coke is produced, which continues to burn freely without forming dense hard coke masses. Cell structure is developed in the fuel during the heating process, but the coke so formed differs from ordinary bright silvery coke, in that no deposit of bright shiny graphite is formed on the fuel during combustion.

Laying a Fire.

Coals of this type are perhaps rather less readily ignited than the ordinary domestic coals, but ignition can be effected quite readily if the following plan is adopted: The grate is first covered with a layer of small cinders from the previous day's fire. Paper and wood are laid on the cinders, and then the larger cinders are placed on top of the wood. The fresh coal is placed on top of the large cinders.

PHURNOD

Smokeless Coal

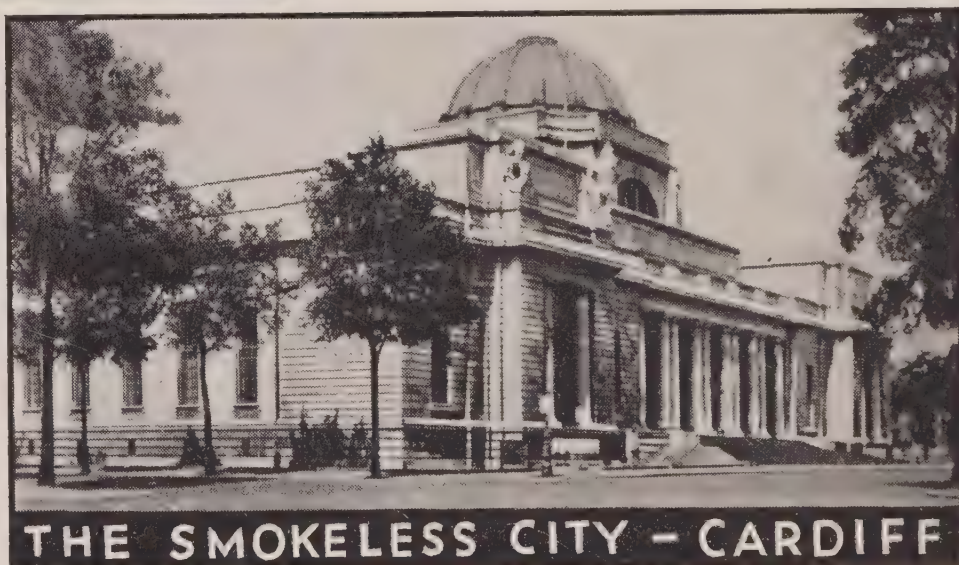


THE SMOKY CITY - LONDON

The Report on atmospheric pollution issued by the Industrial Research Dept. gives the following figures for days of thick smoke haze for the two cities: LONDON 61%
CARDIFF - 0%



THE SOUTH WALES
SMOKELESS COAL



THE SMOKELESS CITY - CARDIFF

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This plan is also a great advantage when starting up a fire with ordinary gas coke, two layers of cinders being used, and fresh coke on top of the second layer of cinders. It is unwise to lay the paper and wood direct on a clean grate as the bars conduct heat away from the wood, the advantage of which heat is thus lost, as far as ignition is concerned. It is a remarkable fact worth remembering that cinders obtained from coke and from the smokeless coals, including anthracite, ignite very readily. They should therefore not be wasted, but utilized as indicated.

Small Hot-Water Boilers.

The fuel provider and the heating engineer are called upon to meet the increasing demands of the householder for comfort, cleanliness, and efficient service. In many cases it is found that the open fire, cheerful though it unquestionably proves to be, is not alone sufficient where the best standards of comfort have to be met. It is not always pleasant to leave a comfortably warm room on a cold day to pass to and fro through halls and passages which are unheated. Moreover, the influx of cold air into a room from such passages causes a certain amount of discomfort. For these reasons the use of hot-water boilers, linked up with, say, two radiators, one in the hall, and another on the landing of the bedroom floor proves to be a great advantage, well worth the cost of the installation, even where the builder originally overlooked this convenience. The same boiler provides all the domestic hot water required.

Hot-water boilers, without radiators, are in much more common use in modern houses, being nowadays rightly regarded as essential conveniences. Dozens of efficient types of boilers are in use, but, as open fireplaces are still, and always will be, popular in Great Britain, the housewife may wish to be provided with an *all-purpose solid fuel*, that is to say, one which can be used both in the open grate and the hot-water boiler.

Sized Coals.

For the hot-water boiler the coal must be suitably graded, the more uniform the size the greater its efficiency. It is only during comparatively recent years that the full significance of the effect of correct sizing of fuels became appreciated, and it applies in almost every department in which coal and coke are used. Welsh smokeless coal producers are now fully alive to the advantages to be derived from proper sizing and grading, a matter which is no less important than coal cleaning, and clean sized smokeless coals are available for all types of boilers.

The correct size of coal depends on the size and type of boiler or grate. Various grades are produced to meet varying requirements, and in all cases where the appropriate sizes are used, satisfaction and high efficiencies are assured. No difficulty is experienced in such circumstances in maintaining regularity, continuity, and uniformity of combustion, while at the same time the boiler can be controlled to meet variations in demand. Consumers can, if desired, maintain their hot-water boilers in continuous operation throughout the year.

Use of Coals in Closed Stoves.

Anthracites and smokeless coals are successfully used in closed stoves and hot-water boilers, in appliances where coke may also be used. The use of steam coals in this connection has expanded very considerably during the past few years, due to the fact that high efficiencies are being obtained. Some careful consumers will prefer the best anthracite nuts for a hot-water boiler; others equally discriminating will choose the semi-anthracite or semi-bituminous; a third group will select graded coke for the same type of boiler, while a fourth would consider it preferable to use a semi-coke, or a mixture of semi-coke and Welsh smokeless coal, for both the boiler and the open grate. What can be stated definitely is that any and all of these smokeless fuels can be successfully used in hot-water boilers and closed stoves. The advantages of the hot-water boiler using smokeless Welsh coal are now so well known as to call for no further recommendation.

Calorific Value.

The calorific value, or heat-giving value, of a fuel is not in itself sufficient in comparing the relative merits of fuels. A high-volatile smoky coal may approach a smokeless coal in calorific value, yet 20 per cent or so of the energy of the smoky coal will be readily wasted during the distillation period preceding combustion, unburnt products thus escaping through the chimney.

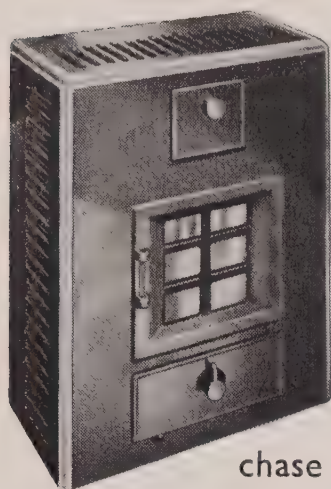
In addition to having a high calorific value the fuel should contain a minimum of incombustible constituents and a maximum of combustible. Its radiant efficiency must be high. The fuels should be smokeless or practically so during combustion. The ash content should be low and its fusion point high. It should burn sufficiently vigorously in the heating apparatus, but its combustion should be readily controlled without difficulty, so as to meet fluctuations in demand.

The cost of maintaining adequate heat is of importance to consumers, and in the continuous heating of rooms of any appreciable size, solid fuel has been proved to be less expensive than gas by about $\frac{1}{3}$ to $\frac{1}{2}$, and is from 5 to 7 times cheaper than electricity. Gas and electricity, however, possess the merits of cleanliness, ease of control for regular and intermittent operation, and complete absence of smoke.

Thermostatic Control.

It has often been claimed that gas and oil possess advantage over solid fuels for large heating installations in that combustion can be thermostatically controlled. There are however, several types of automatic stokers now in use burning solid fuel which are successfully and accurately controlled thermostatically. Therefore, large offices, public buildings, hotels and hospitals can be economically heated continuously with solid smokeless fuel without creating any smoke nuisance in towns and cities, large or small. During recent years many of the more important London and provincial hotels and hospitals have reverted from oil to solid fuel, and this practice is extending.

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An ESSE Anthracite Heating Stove, being hopper fed, ensures continuous regular heat in some cases for as little as 3d. for 24 hours. Entirely free from smoke, dust and fumes, the ESSE needs fueling just once each day, and is genuinely trouble-free. Send for catalogues of various models, details of the new Hire Purchase Plan and the name of your nearest dealer, and ask particularly about the B.J. ESSE, as illustrated, specially designed by Betty Joel for homes decorated in the modern style.

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What Constitutes a Good Fuel.

From the viewpoint of the Combustion Engineer.

(a) High calorific value. The fuel should be capable of generating a high output of heat units.

(b) Steady combustion conditions should be maintainable with a minimum of attention.

(c) Smokeless combustion should be possible, and a minimum of noxious products evolved.

(d) The fuel should contain a minimum of ash and sulphur.

(e) The fuel should withstand weathering with little disintegration or change in characteristics.

(f) It should not be liable to spontaneous combustion in storage.

From the Civic Point of View.

Clean atmospheres are essential for the maintenance of health, the protection of buildings, and the avoidance of fogs.

A good fuel is one that yields a minimum of smoke, soot and noxious gases. The health and well-

being of the community demands clear atmospheres and the maximum of sunshine. Such atmospheres have no injurious effect on buildings, do not cause decay nor destroy the beauty of architecture. Fogs interfere with commerce and transport and involve heavy loss in artificial lighting.

From the Domestic Point of View.

The household fuel should—

(a) Possess high heat-radiating properties.

(b) Evolve no smoke or soot.

(c) Demand little attention.

(d) Be low in ash, creating little dust.

(e) Be relatively inexpensive.

From the National Standpoint.

(a) Native fuels should be used, as far as practicable. National economy and national defence demand that British home-produced fuels should be used in every possible department.

(b) Fuel should be in the condition that it would give maximum service with minimum waste.

NEWS AND VIEWS

Combustion Principles.

A new and revised edition of an excellent little textbook on "Combustion in the Boiler Furnace," by H. J. Hodsman, M.B.E., M.Sc., F.I.C., of the University of Leeds, has just been issued. It is primarily for the use of students taking courses and examinations in boilerhouse practice, and is published with the approval of the West Riding of Yorkshire Regional Smoke Abatement Committee.

The preface states that "some effort to impart the chemical principles of combustion seems indispensable to form a basis of rational practice." This the booklet in its three chapters—Introductory, Fuels and their Combustion, and The Flue Gases—very clearly and successfully accomplishes. It is published by Jowett and Sowry Ltd., Albion Street, Leeds, 1, at the price of 1/- post free.

Smoke in Bengal.

The 31st Annual Report of the Bengal Smoke Nuisance Commission for the year 1936 has been received. It records the very creditable activity of the Commission and its Inspectors. In 1906 when the work began the average emission of smoke from each factory chimney was the equivalent of 13.1 minutes of dense black smoke per hour. By 1936 this had been reduced to 0.08 minutes per hour.

A watch is kept on the smoke nuisance from the Central Smoke Observatory, which is equipped with

a telephone so that the owner or manager of an offensive chimney may be called up and the emission of smoke of prohibited density (No. 6 on the Ringelmann chart) brought to his notice. Observations of locomotives, steamers, launches, and minor industrial plant are taken locally. The total number of observations made during the year was 6,496.

An important differentiation of duties is stressed by the following extract from the report :—

"The observation of smoke is carried out by the two Assistant Inspectors who alternately devote half a day to this duty. A Smoke Inspector is a qualified engineer and a combustion specialist, and his principal duties are to ascertain by tests, etc., the causes of defective installations and suggest means to remedy the same. His services are therefore chiefly required at the factory where he can advise on smoke prevention and fuel economy. Every case of smoke nuisance may call for a very particular solution according to varying conditions.

"European and American smoke abatement organizations employ Smoke Observers, in addition to Smoke Inspectors. In 1926, the Commission recommended to the Government that Smoke Observers should be appointed to relieve the Inspectors, so as to allow the latter to devote full-time towards the technical duties of smoke abatement. Administrative approval was obtained in 1927 to this recommendation but the Commission regrets that financial stringency is still a hindrance to this important scheme being carried into effect."

AS OTHERS SEE US



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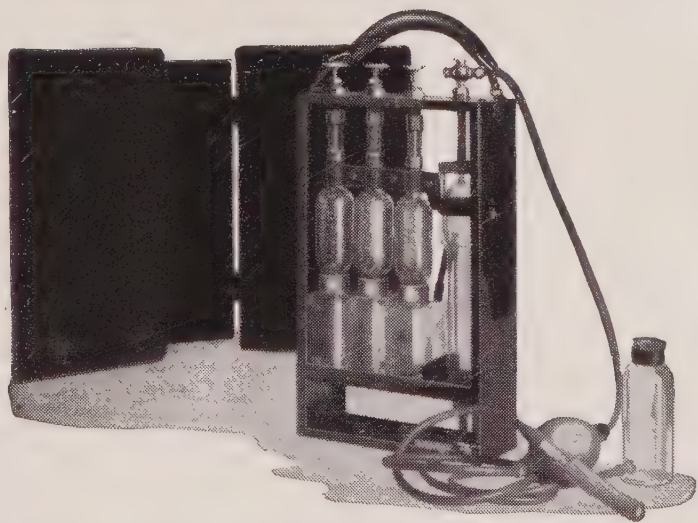


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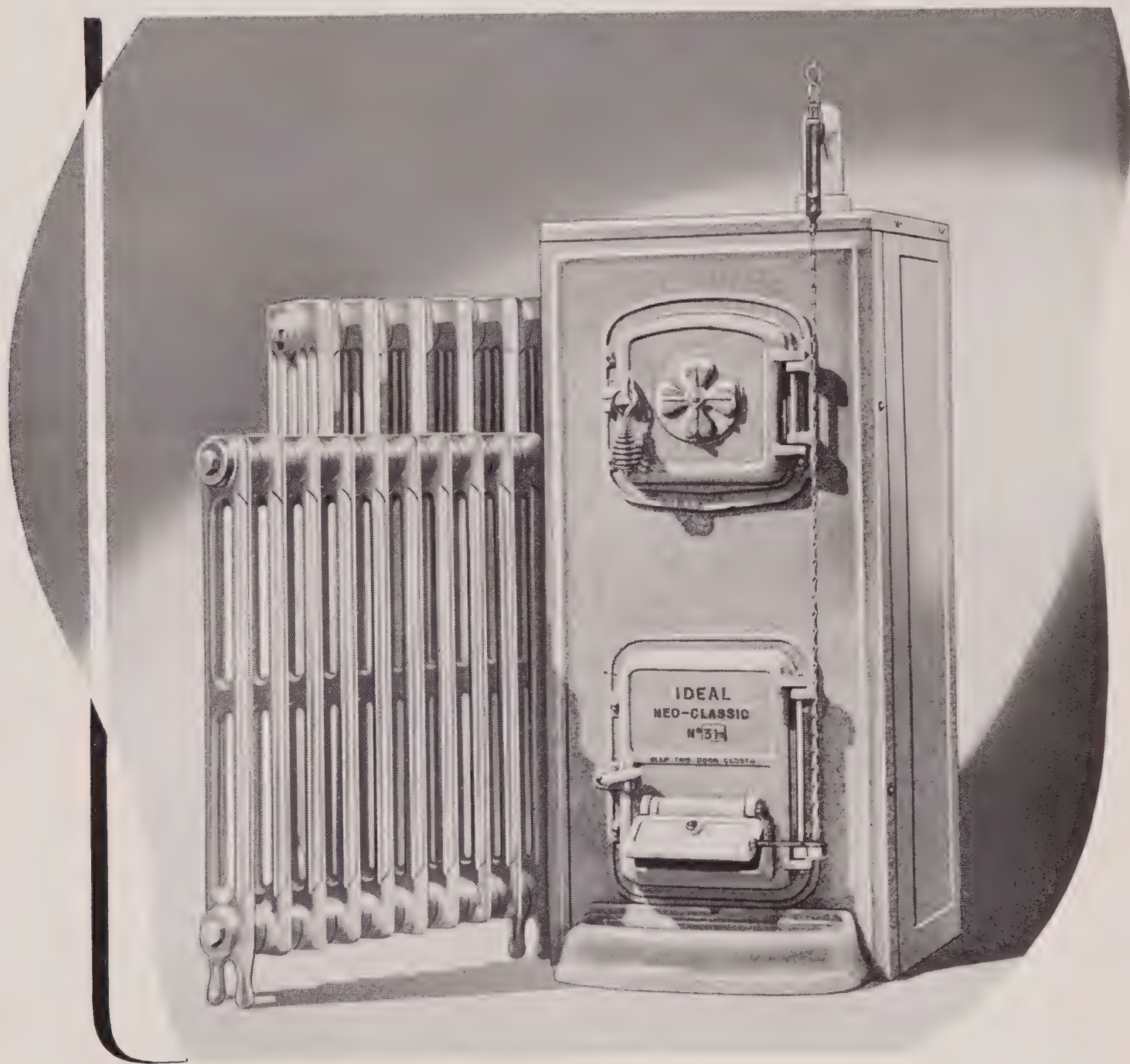
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burning smokeless fuel. Besides being one of the cleaner forms of warming, central heating is undoubtedly the most healthy, efficient and economical. If you are interested in smoke abatement and personal comfort install Ideal Central Heating—the warmth that warms without smoke or fumes.

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